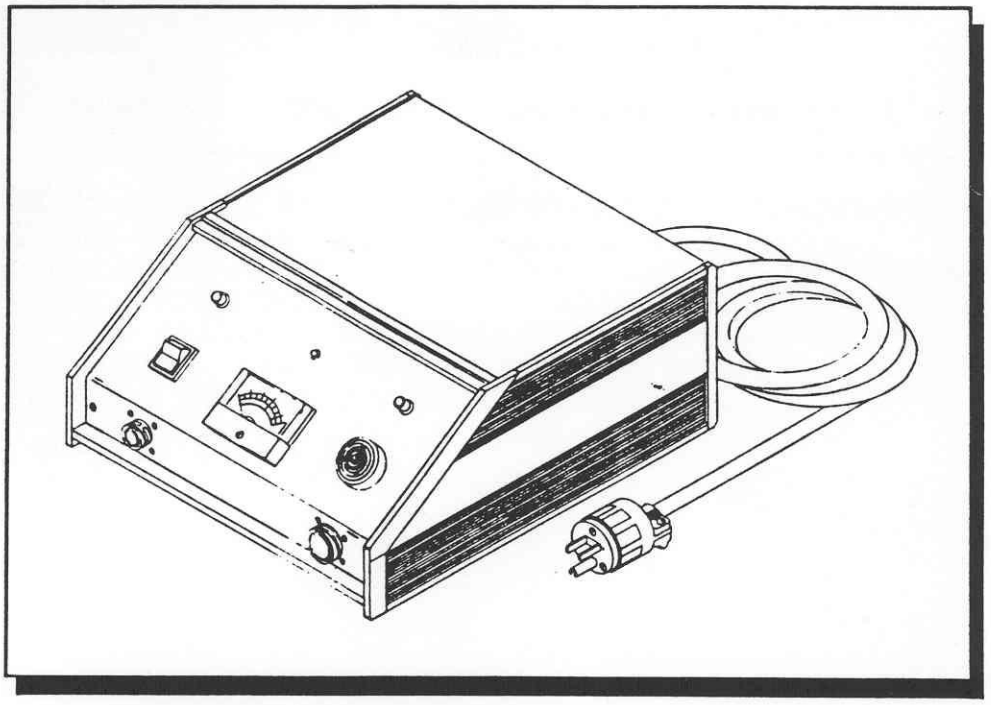
Operation Instruction Manual

Eye Magnet

Series 10K



DLA120-91-C-8516
(DEPMEDS-AT-06)

Date Effective: October 1 ,1991

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IDENTIFYING TECHNICAL PUBLICATION SHEET

FOR

COMMERCIAL MANUAL

1. **PURPOSE:** This technical publication is issued for the purpose of identifying and authorizing the following commercial manual for Defense Supply Agency use.

MANUFACTURER:	Scientronics Manufacturing Company Flower Field, Building 1 St. James, NY 11780
CONTRACT NUMBER:	DLA120-91-C-8516
EQUIPMENT:	Series 10K Eye Magnet
NATIONAL STOCK NO.	6540-01-340-0844
TITLE:	Operating Instruction Manual
DATE:	April 20, 1990

2. **FILE LOCATION:** The above described commercial manual is filed in _____.

3. **AUTHORITY NOTICE, DISTRIBUTION STATEMENT, DISCLOSURE NOTICE:**

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OPERATION MANUAL

CONTRACT NUMBER: DLA120-91-C-8516

NOMENCLATURE: SCIENTRONICS MANUFACTURING CORPORATION SERIES 10K EYE MAGNET

SECTION I. GENERAL INFORMATION

1.1. GENERAL.

1.1.1. This section provides a general description of the Scientronics Manufacturing Corporation Series 10K Eye Magnet and its features. System specifications are also provided in this section.

1.2. EQUIPMENT DESCRIPTION.

1.2.1. The Scientronics Manufacturing Corporation Series 10K Eye Magnet is an electrically powered magnetic device which is principally used for extracting ferrous magnetic particles from the eye. The system components are shown in figure 1-1.

1.2.2. When enabled, the 10K eye magnet produces a magnetic field pulsating at approximately 10,000 gauss/peak which is superimposed on a steady state low magnetic field. These two magnetic fields together produce a dislodging force to aid in the removal of an embedded ferro-magnetic foreign body or particle from an eye. This instrument can be used in a private office or hospital emergency or operating room as required.

1.2.3. The unit is internally configured to operate from an electrical input of 110 volts ac +/-10%, 50 or 60 Hz. The unit can be operated from an input of 220 volts ac +/-10%, 50 or 60 Hz with no internal changes through use of the associated external step-down transformer.

1.2.4. This instrument is packaged in a portable shipping container which allows flexibility of use at various locations and convenient storage. The magnetic head is removable from the control panel via a connector, thus allowing sterilization of the magnetic head assembly.

1.2.5. An automatic circuit protects the instrument from heat damage. An additional circuit alerts the operator of high heat build-up at the magnetic head assembly tip due to sustained use. This circuit is designed to produce a pulsing alarm tone, then force complete circuit shut-down 60 to 90 seconds later.

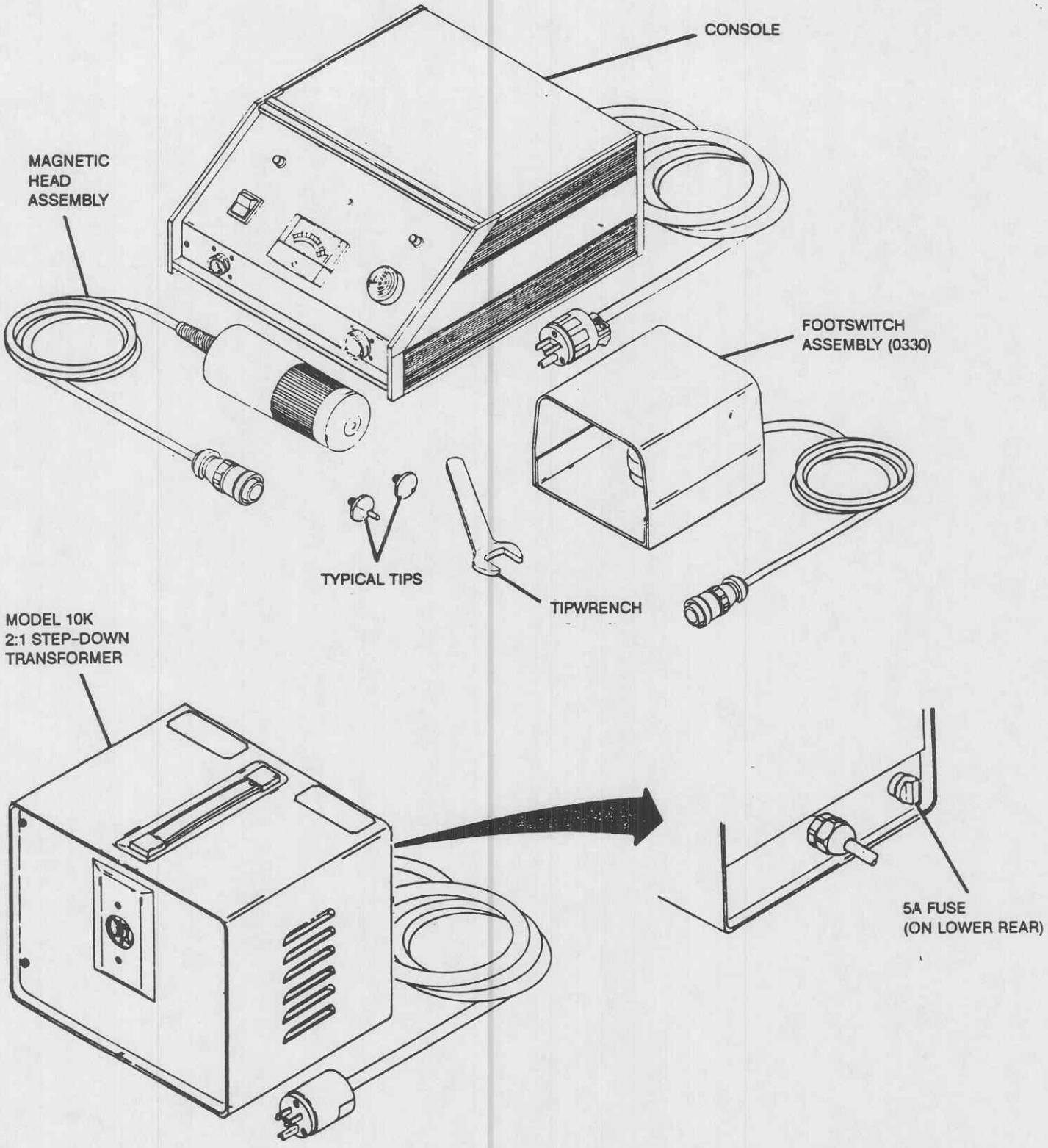


Figure 1-1. Series 10K Eye Magnet System Components

1.2.6. The Scientronics Manufacturing Corporation Series 10K Eye Magnet is registered with the Bureau of Medical Devices (BMD) as a Class II device under Section 886.440.

1.3. SPECIFICATIONS.

1.3.1. Table 1-1 lists the parameters related to the Scientronics Manufacturing Corporation Series 10K Eye Magnet.

TABLE 1-1. SPECIFICATIONS (SHEET 1 OF 2)

Input Voltage	110 volts ac +/-10 %, 50/60 Hz or 220 volts ac +/-10 %, 50/60 Hz as specified.
AC Line Protection	10 Ampere Circuit Breaker.
Leakage Current	50 microamperes, maximum.
Magnetic Strength	Pulsating pulse field high (11,000 Gauss) and low (1,000 Gauss).
Magnetic Duty Cycle	350 milliseconds on/300 milliseconds off.
Temperature Protection Sequence	High temperature audible warning sounds after approximately 2 to 3 minutes of continuous operation from cold start of 72 degrees fahrenheit (22.22 degrees Celsius) or less. Automatic shut-down occurs approximately 1.5 minutes after the high temperature warning.
Shipping Container Dimensions	Length: 37 inches (93.98 cm). Width: 31 inches (78.74 cm). Height: 15 inches (38.10 cm).
Console Dimensions	Length: 13 inches (33.02 cm). Width: 11 inches (27.94 cm). Height:5 inches (12.7 cm).
Transformer Dimensions	Length: 8.625 inches (21.91 cm). Width: 10.125 inches (25.72 cm). Height: 8.5 inches (21.59 cm).
Weight of Console and Accessories (excluding transformer)	17 pounds (7.71 Kg).
Transformer Weight	25 pounds (11.34 Kg).
Total Weight packed in Shipping Container	113 pounds (51.26 Kg).

1.4. RELATED PUBLICATIONS.

1.4.1. The following publications are referenced by this document:

TITLE	PUBLICATION NO.
Series 10K Eye Magnet Maintenance Manual	DEPMEDS-AT-05

SECTION II. UNPACKING INSTRUCTIONS.

2.1. GENERAL.

2.1.1. This section details unpacking and installation instructions for the Scientronics Manufacturing Corporation Series 10K Eye Magnet.

2.2. UNPACKING.

2.2.1. Press the pressure equalizing valve on the front of the shipping container to assure that the pressure inside is at the ambient room pressure. Open the shipping container.

2.2.2. The following items are packed inside the shipping container:

	ITEM	PART NUMBER
A.	Console.	10K
B.	Step-Down Transformer Assembly.	10KT
C.	Magnetic Head Assembly.	584
D.	Foot Pedal and Guard.	330
E.	Wrench for Magnet Tips.	HST0555
F.	Blunt Tip.	HST0009
G.	Lance Tip.	HST0008
H.	3.0 millimeter Straight Tip.	0157
I.	6.0 millimeter Straight Tip.	0158
J.	12.0 millimeter Straight Tip.	0159

2.3. INSTALLATION.

2.3.1. The Series 10K Eye Magnet can be used in either a private office or hospital environment. When used in a private office, it is essential that the unit or the associated step-down transformer assembly is plugged into a properly grounded and wired hospital-grade ac wall receptacle.

2.3.2. Once an area has been established in which to use the instrument, the unit and/or the associated step-down transformer assembly may remain plugged into the outlet or they can be stored, as desired.

SECTION III. OPERATION

3.1. GENERAL.

3.1.2. This section lists the controls and indicators and provides operational procedures for the Scientronics Manufacturing Corporation Series 10K Eye Magnet.

3.2. CONTROLS AND INDICATORS.

3.2.1. The function of each control or indicator is listed in table 3-1. Figure 3-1 shows the position of each control or indicator listed in table 3-1.

3.2.2. The control panel is identified as the front of the console. All of the items listed in table 3-1 are located on the control panel with the exception of the circuit breaker which is located on the rear of the unit.

TABLE 3-1. CONTROLS AND INDICATORS (Sheet 1 of 2)

1. POWER switch/indicator	Switch: Allows on/off power control. Indicator: Illuminates to indicate power is on.
2. BREAKER indicator	Illuminates to indicate when the circuit breaker has opened.
3. Circuit Breaker	Provides overload protection for the Series 10K Eye Magnet.
4. OVERTEMP indicator	Flashes if the magnet stops pulsating when foot switch is pressed (such as in a temperature shut-down sequence).
5. OUTPUT indicator	Pulses on and off when foot switch is pressed to signify magnetic pulsing and unit operation.
6. Audible Indicator	Provides an audible warning tone when the magnetic head assembly temperature is excessive.
7. MAGNET connector	Provides a means to connect the magnetic head assembly.
8. Meter	Indicates approximate temperature of magnetic head assembly tip.

TABLE 3-1. CONTROLS AND INDICATORS (Sheet 2 of 2)

9. FOOTSWITCH connector	Provides a means to connect the foot switch.
10. Foot switch	Provides a convenient means to activate the magnetic head assembly.

3.3. OPERATION.

WARNING: THE SERIES 10K EYE MAGNET IS GROUNDED THOROUGH THE POWER PLUG, THEREFORE THIS UNIT CAN BE CONSIDERED GROUNDED ONLY WHEN CONNECTED TO A RECEPTACLE MARKED AND KNOWN TO BE OF "HOSPITAL GRADE."

3.3.1. Operation the unit only requires that it be plugged in, the power switch operated to on, and the foot pedal placed at a convenient location.

WARNING: DO NOT USE THIS INSTRUMENT IN THE PRESENCE OF FLAMMABLE ANESTHETICS.

CAUTION: DO NOT OVER-TIGHTEN THE MAGNETIC HEAD ASSEMBLY TIP IN THE FOLLOWING STEP.

3.3.2. The surgical nurse should use the sterilized open-end wrench provided with the unit to secure the appropriate sterilized tip into the sterilized magnetic head assembly. Do not over-tighten the tip.

3.3.3. The circulating nurse should connect the magnetic head assembly and the foot switch electrical connectors to their respective console connectors. When mating the cable connectors, the keying slots on the face of each connector must be matched prior to tightening the shell of the connector. When both halves are properly mated, the snap lock will engage, which can be both felt and heard.

CAUTION: DO NOT TURN ON SYSTEM POWER IF THE MAGNETIC HEAD ASSEMBLY IS NOT CONNECTED.

3.3.4. After the magnetic head assembly is connected, operate the POWER switch on. When the foot switch is pressed, a pulsating magnetic field will be produced at the magnetic head probe tip. To indicate operation, the OUTPUT indicator will flash.

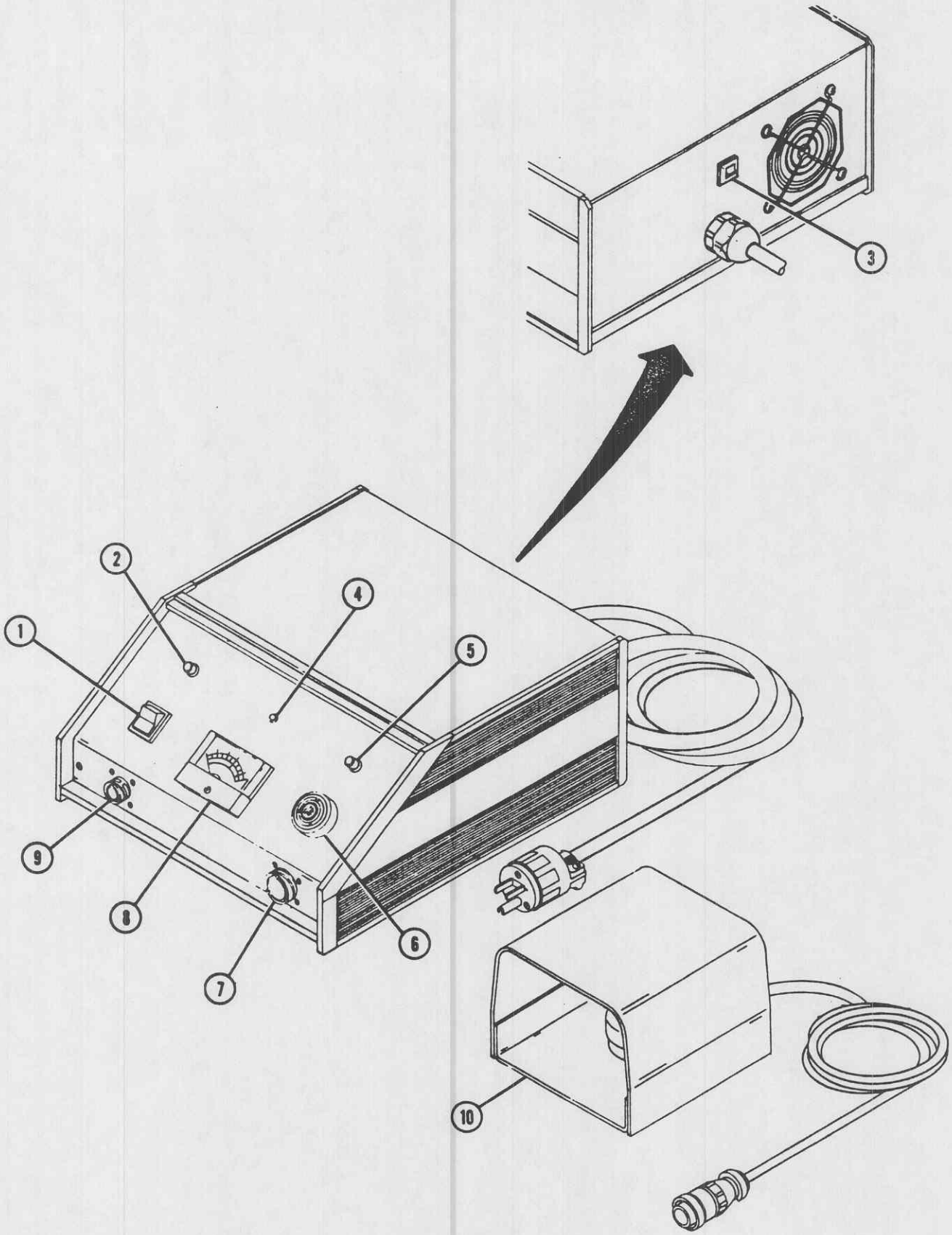


Figure 3-1. Series 10K Eye Magnet Controls and Indicators

3.3.5. For best results, observe the following:

A. Use the shortest tip compatible with surgical exposure. The "blunt tip" will yield a high magnetic field strength and the "lance-like" tip will yield a lower magnetic field strength.

B. Short applications of power (4 to 5 seconds) should be followed by re-localization of the foreign body. No advantage will be obtained by using longer applications.

C. The magnetic tip should be positioned as close to the foreign body as possible as the pulling force increases very rapidly as the distance to the foreign body decreases.

3.3.6. Generation of the high magnetic fields within the small coil volume of the magnetic head assembly will cause a temperature increase in the coil and probe tip. This instrument is designed to provide an audible warning of high temperature after approximately 2 to 3 minutes of continuous operation. The unit will automatically deactivate approximately 60 to 90 seconds later (assuming that the magnetic head assembly starts cold and that the ambient temperature is 72 degrees Fahrenheit (22.22 degrees Celsius) or less).

3.3.7. The magnetic head assembly will require ten to twelve hours of cooling at 72 degrees Fahrenheit (22.22 degrees Celsius) before it can be again used continuously for the full time cycle described in paragraph 3.3.6. The magnet is usable after the audible warning has sounded, but care should be taken to avoid superficial burns. The magnet can also be used intermittently within approximately 1 hour after automatic overheat cutoff, but care should be observed to avoid superficial burns. An approximate indication of the magnetic head assembly tip is provided by the control panel meter.

SECTION IV. STERILIZATION

4.1. GENERAL.

4.1.1. This section details cleaning and sterilization of the magnetic head assembly, the tips, and the tip wrench.

4.2. STERILIZATION.

CAUTION: DO NOT AUTOCLAVE THE MAGNET HEAD ASSEMBLY. THE MAGNET HEAD MUST NOT BE SUBJECTED TO TEMPERATURES ABOVE 140 DEGREES FAHRENHEIT (60 DEGREES CELSIUS).

4.2.1. Ethylene Oxide Gas (ETO) Sterilization is recommended. The magnet head is designed to fit into the Ben Venue Gas Sterilizer. Do not autoclave the magnet head under any circumstances.

4.2.1. The magnet tips and tip wrench may be sterilized in whatever manner is most convenient. The magnet head can be sterilized only with the cold ethylene oxide (ETO) sterilization technique. The recommended sterilization is accomplished using a Ben Venue Gas Sterilizer which assures sterilization at or near ambient room temperature and requires approximately five to eight hours aeration under room temperature.

4.2.2. In lieu of using the Ben Venue Sterilizer, existing cold ethylene oxide (ETO) sterilization facilities may be employed. If the aeration after exposure to ethylene oxide sterilization is performed in a chamber occasionally using dry heat to speed the aeration process, the heat cycle must never exceed 140 degrees fahrenheit (60 degrees Celsius) or the magnetic head assembly will be damaged.

4.3. TYPICAL ETHYLENE OXIDE (ETO) STERILIZATION PROCEDURE.

4.3.1. Disconnect the magnet head line cord at the connector on the chassis. This accomplished by gently twisting the outer shell of the MAGNET connector counterclockwise. Note that the connector is keyed for easy assembly after sterilization.

4.3.2. Remove the tip from the magnetic head assembly using the tip wrench.

4.3.3. Using a clean and damp towel, wipe down the magnet head, the cable, and connector to remove any foreign material. Also clean the magnet tip and tip wrench.

4.3.4. Wrap the magnet line cord and connector, the magnetic tip, and the tip wrench in appropriate surgical wraps.

4.3.4. Insert the magnet head assembly, magnetic tip, and tip wrench into the ETO chamber and expose the magnet head to ETO for the recommended time.

4.3.5. Remove the magnet head assembly, tip, and tip wrench from the ETO chamber and aerate for the proper amount of time. Do not expose the magnetic head assembly to temperatures in excess of 140 degrees Fahrenheit (60 degrees Celsius) or the assembly will be damaged. If the aeration after exposure to ethylene oxide sterilization is performed in a chamber occasionally using dry heat to speed the aeration process, the heat cycle must never exceed 140 degrees fahrenheit (60 degrees Celsius) or the magnetic head assembly will be damaged.

4.3.6. Unwrap the magnetic head assembly, magnetic tip, and tip wrench in a sterile operating room environment.

WARNING: DO NOT USE THIS INSTRUMENT IN THE PRESENCE OF FLAMMABLE ANESTHETICS.

4.3.7. When ready for use, the surgical nurse should pass the magnetic head assembly electrical out of the sterile field to the circulating nurse who connects the plug to the mating connector.

CAUTION: DO NOT OVER-TIGHTEN THE MAGNETIC HEAD ASSEMBLY TIP IN THE FOLLOWING STEP.

4.3.9. The surgical nurse should use the sterilized open-end wrench provided with the unit to secure the appropriate sterilized tip into the sterilized magnetic head assembly. Do not over-tighten the tip.

4.3.10. The magnetic head assembly and the foot switch electrical connectors must also be connected to their respective console connectors. When mating the cable connectors, the keying slots on the face of each connector must be matched prior to tightening the shell of the connector. When both halves are properly mated, the snap lock will engage, which can be both felt and heard.

WARNING: THE SERIES 10K EYE MAGNET IS GROUNDED THOROUGH THE POWER PLUG, THEREFORE THIS UNIT CAN BE CONSIDERED GROUNDED ONLY WHEN CONNECTED TO A RECEPTACLE MARKED AND KNOWN TO BE OF "HOSPITAL GRADE."

CAUTION: DO NOT TURN ON SYSTEM POWER IF THE MAGNETIC HEAD ASSEMBLY IS NOT CONNECTED.

4.3.11. The circulating nurse should connect the electrical power plug to a source of power.

SECTION V. STORAGE

5.1. GENERAL.

5.1.1. This section details information pertaining to storage of the Scientronics Manufacturing Corporation 10K Eye Magnet and inspection during periods of storage.

5.2. STORAGE.

5.2.1. The Series 10K Eye Magnet is complete in one shipping container. If the shipping container has not been opened (case seal intact) inspection during periods of storage is not required.

5.2.2. If the shipping container seal is broken, the shipping container must be opened and the contents of the shipping container compared to the parts list provided in the shipping container assure the contents are complete. An inventory diagram is also provided in this section (see figure 5-1).

5.3. INSPECTION DURING PERIODS OF USE.

5.3.1. If the Series 10K Eye Magnet is being used, the following items require inspection. The console, foot switch, and magnetic head assembly should be inspected at monthly intervals. The magnetic tips should be inspected annually. If the Series 10K Eye Magnet is used in a corrosive, dusty, or extremely humid atmosphere, the inspection intervals should be increased as deemed locally necessary.

WARNING: Disconnect power before proceeding.

A. Console. Check the overall appearance of the console. If cleaning is required, clean the case with a solution of warm water and a mild detergent. Dry with a clean cloth.

B. Magnetic Head Assembly. When the instrument is operated as outlined in Section III of this manual, the magnetic head assembly will provide trouble-free service. Do not over-tighten the accessory tips. In the event the magnetic head assembly is dropped, permanent damage may result. The line cord should be periodically checked for security at the strain relief at the connector and at the magnetic head assembly.

C. Foot Switch. The foot switch is mounted to the guard to prevent inadvertent magnetic activation. The foot switch is very rugged, however the cable entering the foot switch should be periodically checked for security.

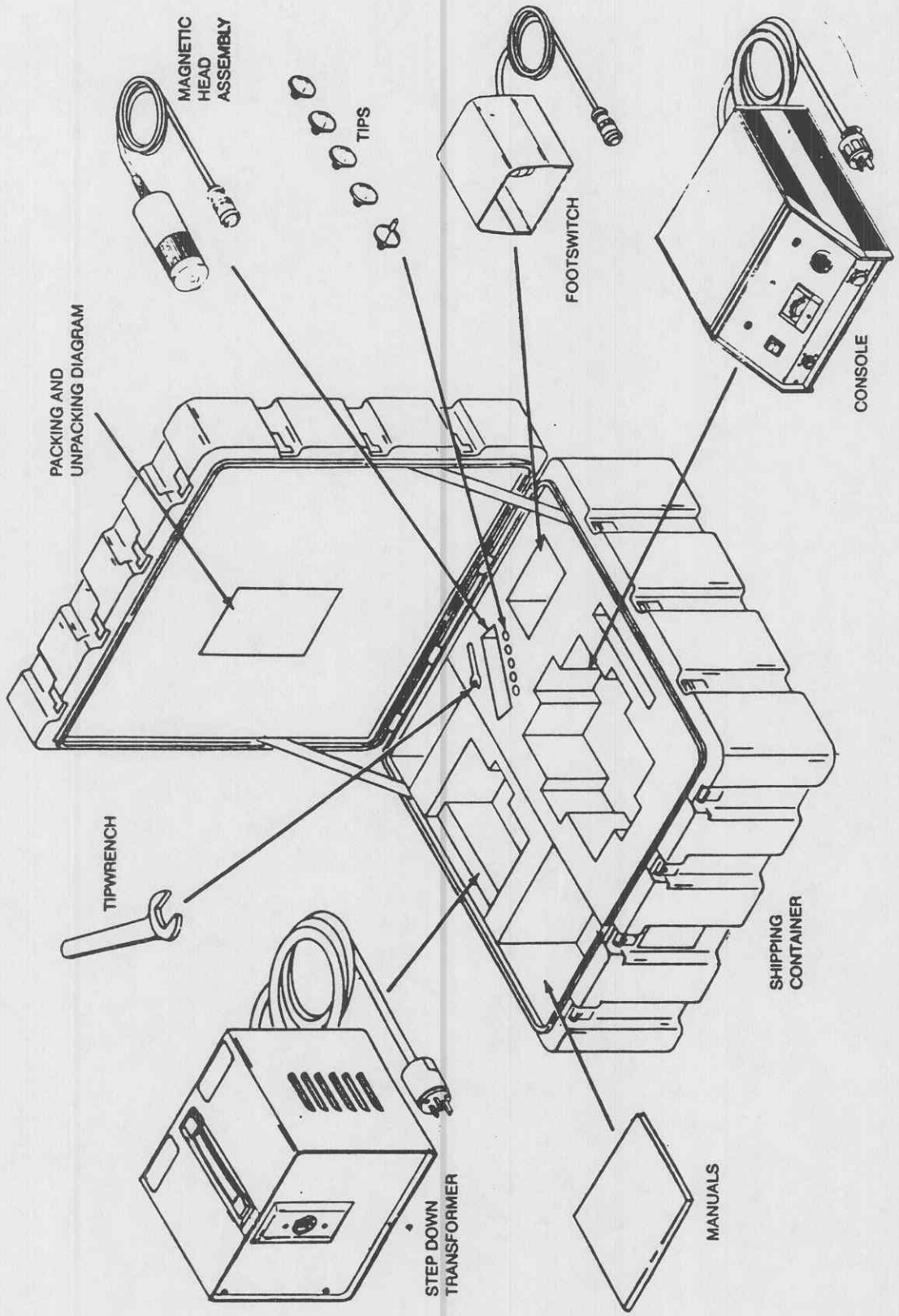


Figure 5-1. Series 10K Eye Magnet Inventory Diagram

D. Magnetic Tips. Check the threads on the magnetic tips to assure they are clean of foreign material and the threads are clear.

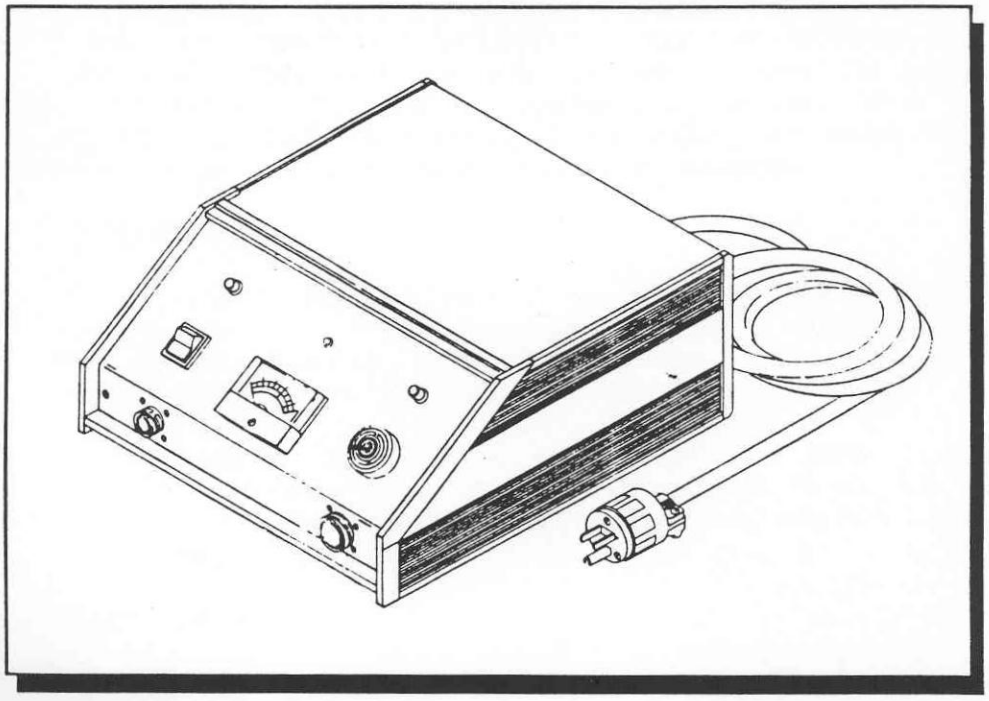
E. Step-Down Transformer Assembly. Check the overall appearance of the transformer assembly case. If cleaning is required, clean the case with a solution of warm water and a mild detergent. Dry with a clean cloth.

F. Manuals. Assure the manuals are completely usable and readable. Manuals that have been exposed to moisture should be replaced.

Maintenance Instruction Manual

Eye Magnet

Series 10K



DLA120-91-C-8516
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NATIONAL STOCK NO.	6540-01-340-0844
TITLE:	Maintenance Instruction Manual
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2. **FILE LOCATION:** The above described commercial manual is filed in _____.

3. **AUTHORITY NOTICE, DISTRIBUTION STATEMENT, DISCLOSURE NOTICE:**

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MAINTENANCE MANUAL

CONTRACT NUMBER: DLA120-91-C-8516

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1.2.3. The unit is designed to operate from an electrical input of 110 volts ac +/-10%, 50 or 60 Hz. The unit can be operated from an input of 220 volts ac +/-10%, 50 or 60 Hz with no internal changes through use of the associated external step-down transformer.

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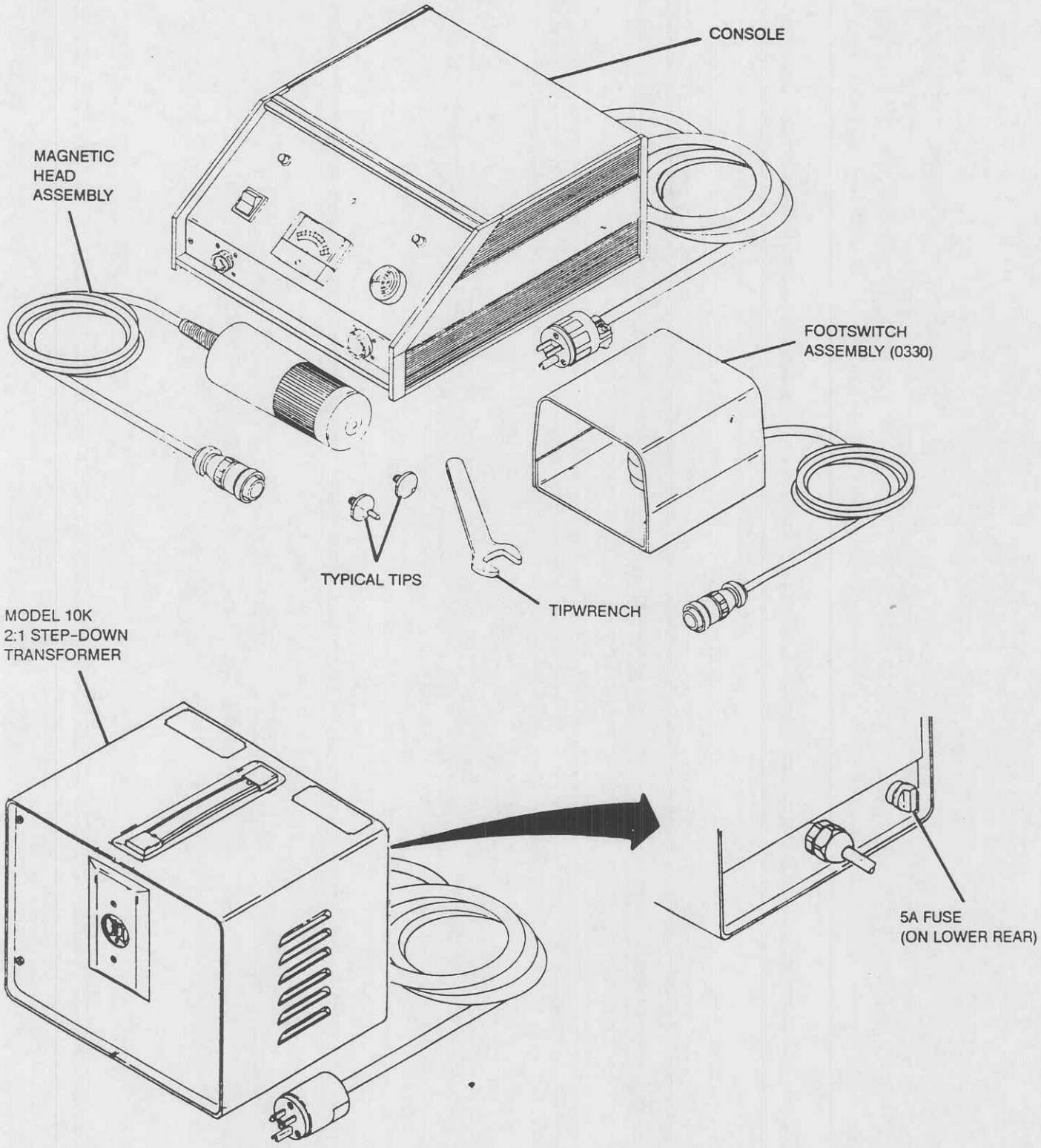

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SECTION III. OPERATION

3.1. GENERAL.

3.1.2. This section lists the controls and indicators and provides operational procedures for the Scientronics Manufacturing Corporation Series 10K Eye Magnet.

3.2. CONTROLS AND INDICATORS.

3.2.1. The function of each control or indicator is listed in table 3-1. Figure 3-1 shows the position of each control or indicator listed in table 3-1.

3.2.2. The control panel is identified as the front of the console. All of the items listed in table 3-1 are located on the control panel with the exception of the circuit breaker which is located on the rear of the unit.

TABLE 3-1. CONTROLS AND INDICATORS (Sheet 1 of 2)

1. POWER switch/indicator	Switch: Allows on/off power control. Indicator: Illuminates to indicate power is on.
2. BREAKER indicator	Illuminates to indicate when the circuit breaker has opened.
3. Circuit Breaker	Provides overload protection for the Series 10K Eye Magnet.
4. OVERTEMP indicator	Flashes if the magnet stops pulsating when foot switch is pressed (such as in a temperature shut-down sequence).
5. OUTPUT indicator	Pulses on and off when foot switch is pressed to signify magnetic pulsing and unit operation.
6. Audible Indicator	Provides an audible warning tone when the magnetic head assembly temperature is excessive.
7. MAGNET connector	Provides a means to connect the magnetic head assembly.
8. Meter	Indicates approximate temperature of magnetic head assembly tip.

TABLE 3-1. CONTROLS AND INDICATORS (Sheet 2 of 2)

9. FOOTSWITCH connector	Provides a means to connect the foot switch.
10. Foot switch	Provides a convenient means to activate the magnetic head assembly.

3.3. **OPERATION.**

WARNING: THE SERIES 10K EYE MAGNET IS GROUNDED THOROUGH THE POWER PLUG, THEREFORE THIS UNIT CAN BE CONSIDERED GROUNDED ONLY WHEN CONNECTED TO A RECEPTACLE MARKED AND KNOWN TO BE OF "HOSPITAL GRADE."

3.3.1. Operation the unit only requires that it be plugged in, the power switch operated to on, and the foot pedal placed at a convenient location.

WARNING: DO NOT USE THIS INSTRUMENT IN THE PRESENCE OF FLAMMABLE ANESTHETICS.

CAUTION: DO NOT OVER-TIGHTEN THE MAGNETIC HEAD ASSEMBLY TIP IN THE FOLLOWING STEP.

3.3.2. The surgical nurse should use the sterilized open-end wrench provided with the unit to secure the appropriate sterilized tip into the sterilized magnetic head assembly. Do not over-tighten the tip.

3.3.3. The circulating nurse should connect the magnetic head assembly and the foot switch electrical connectors to their respective console connectors. When mating the cable connectors, the keying slots on the face of each connector must be matched prior to tightening the shell of the connector. When both halves are properly mated, the snap lock will engage, which can be both felt and heard.

CAUTION: DO NOT TURN ON SYSTEM POWER IF THE MAGNETIC HEAD ASSEMBLY IS NOT CONNECTED.

3.3.4. After the magnetic head assembly is connected, operate the POWER switch on. When the foot switch is pressed, a pulsating magnetic field will be produced at the magnetic head probe tip. To indicate operation, the OUTPUT indicator will flash.

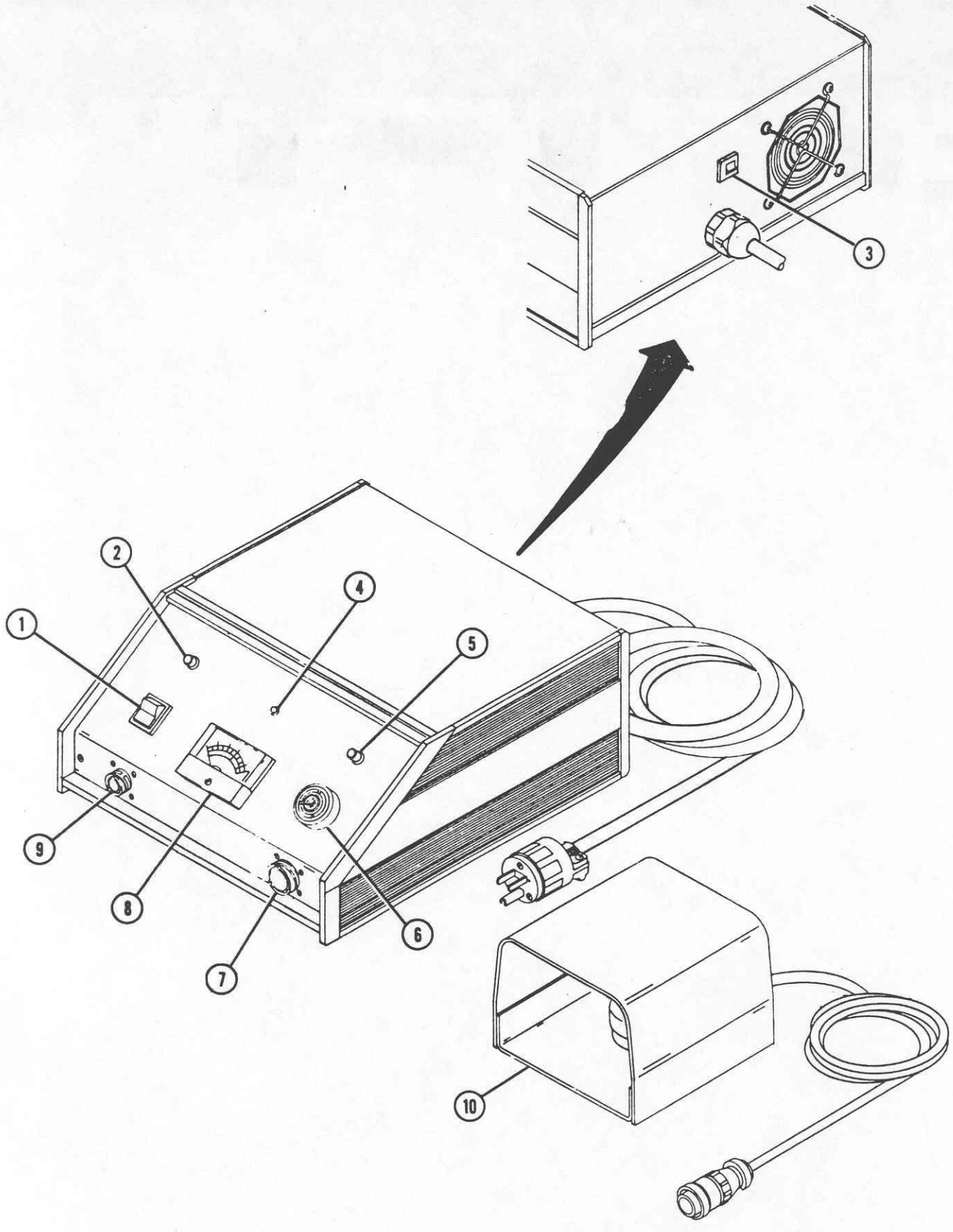


Figure 3-1. Series 10K Eye Magnet Controls and Indicators

3.3.5. For best results, observe the following:

A. Use the shortest tip compatible with surgical exposure. The "blunt tip" will yield a high magnetic field strength and the "lance-like" tip will yield a lower magnetic field strength.

B. Short applications of power (4 to 5 seconds) should be followed by re-localization of the foreign body. No advantage will be obtained by using longer applications.

C. The magnetic tip should be positioned as close to the foreign body as possible as the pulling force increases very rapidly as the distance to the foreign body decreases.

3.3.6. Generation of the high magnetic fields within the small coil volume of the magnetic head assembly will cause a temperature increase in the coil and probe tip. This instrument is designed to provide an audible warning of high temperature after approximately 2 to 3 minutes of continuous operation. The unit will automatically deactivate approximately 60 to 90 seconds later (assuming that the magnetic head assembly starts cold and that the ambient temperature is 72 degrees Fahrenheit (22.22 degrees Celsius) or less).

3.3.7. The magnetic head assembly will require ten to twelve hours of cooling at 72 degrees Fahrenheit (22.22 degrees Celsius) before it can be again used continuously for the full time cycle described in paragraph 3.3.6. The magnet is usable after the audible warning has sounded, but care should be taken to avoid superficial burns. The magnet can also be used intermittently within approximately 1 hour after automatic overheat cutoff, but care should be observed to avoid superficial burns. An approximate indication of the magnetic head assembly tip is provided by the control panel meter.

SECTION IV. STERILIZATION

4.1. GENERAL.

4.1.1. This section details cleaning and sterilization of the magnetic head assembly, the tips, and the tip wrench.

4.2. STERILIZATION.

CAUTION: DO NOT AUTOCLAVE THE MAGNET HEAD ASSEMBLY. THE MAGNET HEAD MUST NOT BE SUBJECTED TO TEMPERATURES ABOVE 140 DEGREES FAHRENHEIT (60 DEGREES CELSIUS).

4.2.1. Ethylene Oxide Gas (ETO) Sterilization is recommended. The magnet head is designed to fit into the Ben Venue Gas Sterilizer. Do not autoclave the magnet head under any circumstances.

4.2.1. The magnet tips and tip wrench may be sterilized in whatever manner is most convenient. The magnet head can be sterilized only with the cold ethylene oxide (ETO) sterilization technique. The recommended sterilization is accomplished using a Ben Venue Gas Sterilizer which assures sterilization at or near ambient room temperature and requires approximately five to eight hours aeration under room temperature.

4.2.2. In lieu of using the Ben Venue Sterilizer, existing cold ethylene oxide (ETO) sterilization facilities may be employed. If the aeration after exposure to ethylene oxide sterilization is performed in a chamber occasionally using dry heat to speed the aeration process, the heat cycle must never exceed 140 degrees fahrenheit (60 degrees Celsius) or the magnetic head assembly will be damaged.

4.3. TYPICAL ETHYLENE OXIDE (ETO) STERILIZATION PROCEDURE.

4.3.1. Disconnect the magnet head line cord at the connector on the chassis. This accomplished by gently twisting the outer shell of the MAGNET connector counterclockwise. Note that the connector is keyed for easy assembly after sterilization.

4.3.2. Remove the tip from the magnetic head assembly using the tip wrench.

4.3.3. Using a clean and damp towel, wipe down the magnet head, the cable, and connector to remove any foreign material. Also clean the magnet tip and tip wrench.

4.3.4. Wrap the magnet line cord and connector, the magnetic tip, and the tip wrench in appropriate surgical wraps.

4.3.4. Insert the magnet head assembly, magnetic tip, and tip wrench into the ETO chamber and expose the magnet head to ETO for the recommended time.

4.3.5. Remove the magnet head assembly, tip, and tip wrench from the ETO chamber and aerate for the proper amount of time. Do not expose the magnetic head assembly to temperatures in excess of 140 degrees Fahrenheit (60 degrees Celsius) or the assembly will be damaged. If the aeration after exposure to ethylene oxide sterilization is performed in a chamber occasionally using dry heat to speed the aeration process, the heat cycle must never exceed 140 degrees fahrenheit (60 degrees Celsius) or the magnetic head assembly will be damaged.

4.3.6. Unwrap the magnetic head assembly, magnetic tip, and tip wrench in a sterile operating room environment.

WARNING: DO NOT USE THIS INSTRUMENT IN THE PRESENCE OF FLAMMABLE ANESTHETICS.

4.3.7. When ready for use, the surgical nurse should pass the magnetic head assembly electrical out of the sterile field to the circulating nurse who connects the plug to the mating connector.

CAUTION: DO NOT OVER-TIGHTEN THE MAGNETIC HEAD ASSEMBLY TIP IN THE FOLLOWING STEP.

4.3.9. The surgical nurse should use the sterilized open-end wrench provided with the unit to secure the appropriate sterilized tip into the sterilized magnetic head assembly. Do not over-tighten the tip.

4.3.10. The magnetic head assembly and the foot switch electrical connectors must also be connected to their respective console connectors. When mating the cable connectors, the keying slots on the face of each connector must be matched prior to tightening the shell of the connector. When both halves are properly mated, the snap lock will engage, which can be both felt and heard.

WARNING: THE SERIES 10K EYE MAGNET IS GROUNDED THOROUGH THE POWER PLUG, THEREFORE THIS UNIT CAN BE CONSIDERED GROUNDED ONLY WHEN CONNECTED TO A RECEPTACLE MARKED AND KNOWN TO BE OF "HOSPITAL GRADE."

CAUTION: DO NOT TURN ON SYSTEM POWER IF THE MAGNETIC HEAD ASSEMBLY IS NOT CONNECTED.

4.3.11. The circulating nurse should connect the electrical power plug to a source of power.

SECTION V. THEORY OF OPERATION

5.1. GENERAL.

5.1.1. This section provides theory of operation for the electrical circuitry used in the Scientronics Manufacturing Corporation Series 10K Eye Magnet. Refer to the block diagram (figure 5-1) and schematic diagram in Section VIII for the following discussion.

5.2. THEORY OF OPERATION.

5.2.1. The Series 10K Eye Magnet is internally configured to operate from an electrical input of 110 volts ac +/-10 %, 50 or 60 Hz. The unit can be operated from an input of 220 volts ac +/-10 %, 50 or 60 Hz by use of a 2:1 primary step-down transformer. A 5-ampere fuse protects the transformer assembly from electrical overloads.

5.2.2. When the POWER switch (SW1) is set to on, the indicator in the center of the POWER switch will illuminate to indicate power is applied to the unit. Metal-Oxide Varactor diode D1 provides transient protection for the subsequent circuitry. A fan which operates from the primary ac input assures cool operation.

5.2.3. Circuit breaker SW2 provides overload protection for the internal circuitry. If the circuit breaker opens, the front-panel BREAKER indicator (PL2) will illuminate and the fan will halt operation.

5.2.4. A potential from step-down transformer T1 is rectified by diode bridge D2, filtered by capacitor C1, and regulated into a positive 12-volt source by IC1. This source is energized whenever the unit is connected to power, the POWER switch is set to the on position, and the circuit breaker is closed. The positive 12-volt potential operates the audible warning circuitry, the meter circuitry, and the magnetic head assembly pulsing.

5.2.5. Relay RL1 is controlled by both the foot switch and timer U2. When the foot switch is pressed, relay RL1 will close and open as current from timer U2 pulses relay K1 on for 350 milliseconds and off for 300 milliseconds. This on/off control of relay RL1 produces the magnetic head assembly pulsing.

5.2.6. One set of normally-open contacts of relay K1 control application of the primary input potential to the input of solid-state relay TR1. When TR1 energizes, the primary input potential is connected across a Metal-Oxide Varactor diode (D5) which functions as an ac blocking device. This primary ac potential is rectified, filtered, and is used to activate the magnetic head assembly during operation.

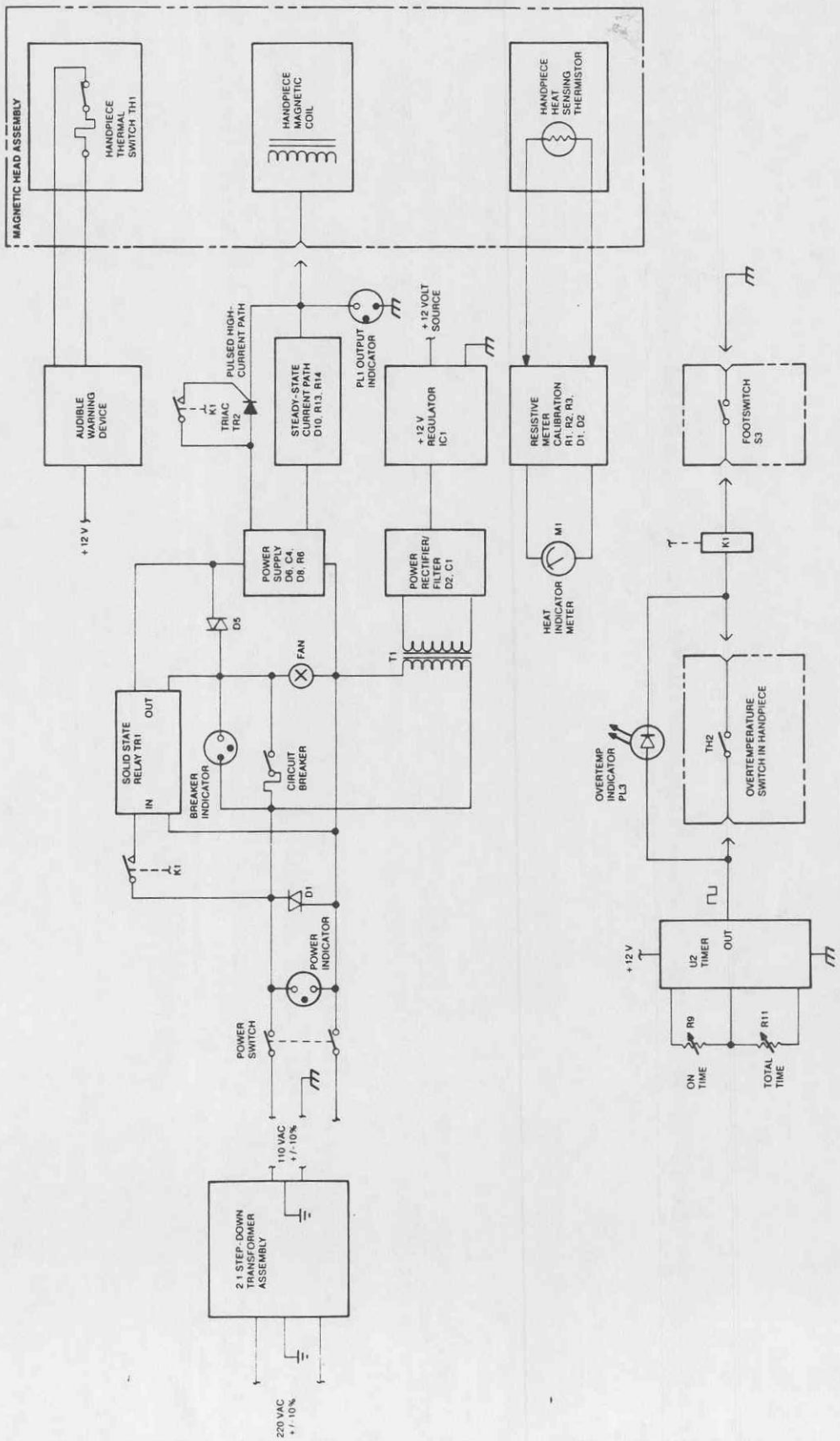


Figure 5-1. 10K Eye Magnet Block Diagram

5.2.7. Diode D10 and Resistors R13 and R14 connected across Triac TR2 produce the steady-state 1000 gauss magnetism of the magnetic head assembly.

5.2.8. A second set of normally-open contacts of relay K1 energizes Triac TR2 which applies a high potential to the magnetic head assembly to produce pulsations in the magnetic head assembly magnetism which adds an additional 10,000 gauss to the steady-state magnetism of 1000 gauss. The front-panel OUTPUT indicator will flash on and off to indicate operation of the pulsing circuit.

5.2.9. After operation of the magnetic head assembly for approximately 2 to 3 minutes, thermal switch TH1 in the magnetic head assembly will open. Current through the console front-panel audible warning device will produce an audible temperature warning. Continuous operation of the circuitry for 1 to 1.5 minutes additional will cause thermal switch TH2 in the magnetic head assembly to open which halts operation of the unit by removing the operating potential from relay K1. When the unit is in thermal shut-down, the front panel OVERTEMP indicator (PL3) will flash to indicate thermal shut-down has occurred.

5-2.10. A front-panel meter indicates the relative temperature of the handpiece. the output of a heat sensor in the handpiece is calibrated with a resistive network and is indicated by meter M1.

5.2.11. When thermal shut-down occurs, the magnetic head assembly will require several hours of cooling before the device can be used again.

SECTION VI. MAINTENANCE

6.1. GENERAL.

6.1.1. This section provides maintenance instructions for the Scientronics Manufacturing Corporation Series 10K Eye Magnet.

6.2. SAFETY CONSIDERATIONS.

6.2.1. Hazardous voltages are used throughout the 10K Eye Magnet console, therefore maintenance with power applied is not recommended.

WARNING: HIGH POTENTIALS ARE EXPOSED ON THE TERMINALS OF SOLID-STATE RELAY TR1, THE THREE LARGE RESISTORS (R6, R13, AND R14), FILTER CAPACITOR C4, THE TERMINALS OF BRIDGE-RECTIFIER D6, AND TRIAC TR2.

6.3. FIRST LEVEL MAINTENANCE.

6.3.1. First level or preventive maintenance of the 10K Eye Magnet falls into the category of good housekeeping and checking certain items at regular intervals to forestall equipment failures. If the equipment is not in use, there is no periodic maintenance required. If the equipment is in use, the following items should be checked at yearly intervals, or more frequently if local conditions require more frequent checks.

A. FOOT SWITCH.

1. Connect an ohm meter to pins A and B of the foot switch plug. Assure continuity exists when the switch is pressed, and that an open circuit exists when the switch is released.

2. Examine the cable connected to the foot switch plug. Assure the cable is clean and is in good condition, particularly at the foot switch and at the connector.

B. HANDPIECE.

1. Examine the cable connected to the handpiece. Assure the cable is clean and is in good condition, particularly at the handpiece and at the connector. Assure the strain relief at the handpiece is secure.

C. CONSOLE.

1. Assure all electrical connectors are secure.

2. Assure the strain relief on the electrical cord is secure.

3. Clean any stains or residue from the console case.

4. Check the output of the 12-volt regulator as follows:

a. Connect the positive probe of a dc voltmeter to pin 8 of timer U2. Connect the negative probe to pin 1 of timer U2.

b. Connect the handpiece to the console. Do not connect the foot switch.

WARNING: **HAZARDOUS POTENTIALS ARE EXPOSED WITHIN THE SERIES 10K EYE MAGNET. DO NOT TOUCH ANY COMPONENT WHEN CHECKING THE DC OUTPUT POTENTIAL OF REGULATOR IC1.**

c. Apply power to the unit.

d. The voltmeter must indicate +12 volts +/-0.5 volts dc.

e. Disconnect power.

f. If the output of IC1 is incorrect, assure the following:

Power is disconnected.

Capacitor C4 is completely discharged.

WARNING: **HAZARDOUS POTENTIALS ARE EXPOSED WITHIN THE SERIES 10K EYE MAGNET. DO NOT PROCEED UNTIL POWER IS DISCONNECTED AND CAPACITOR C4 IS COMPLETELY DISCHARGED.**

g. Replace regulator IC1 and assure the 12-volt source is 12 volts +/-0.5 volts.

6.4. SECOND LEVEL MAINTENANCE.

Second level maintenance consists of procedures required to restore the 10K Eye Magnet to satisfactory operation after a fault has occurred. Table 6-1 provides troubleshooting information using observable symptoms to isolate a problem to an area. Refer to the schematic diagram (figure 8-1) to interpret this information.

TABLE 6-1. TROUBLESHOOTING (SHEET 1 OF 2)

SYMPTOM	RESOLUTION
Indicator in POWER switch does not illuminate.	Unit not connected to power, line cord open, or POWER switch defective.
BREAKER indicator illuminates and fan does not operate.	Rear-panel circuit breaker open. Reset breaker one time.
	WARNING: HAZARDOUS POTENTIALS ARE EXPOSED WITHIN THE SERIES 10K EYE MAGNET. DO NOT PROCEED UNTIL POWER IS DISCONNECTED AND CAPACITOR C4 IS COMPLETELY DISCHARGED.
	If breaker opens again, isolate short in power supplies using resistance checks.
Steady-state magnetism inoperative.	**WARNING: HAZARDOUS POTENTIALS ARE EXPOSED WITHIN THE SERIES 10K EYE MAGNET. DO NOT PROCEED UNTIL POWER IS DISCONNECTED AND CAPACITOR C4 IS COMPLETELY DISCHARGED.**
	Defective D10, R13, or R14.
OVERTEMP indicator constantly illuminated.	With magnetic head assembly cool, check continuity through overtemp switch TH2. if open, replace magnetic head assembly.

TABLE 6-1. TROUBLESHOOTING (SHEET 2 OF 2)

SYMPTOM	RESOLUTION
Magnetic head assembly does not energize when when foot switch is pressed.	If OUTPUT indicator illuminates, isolate open in magnetic head assembly with resistance checks. If OUTPUT indicator does not illuminate and fan is operative, note if relay K1 opens and closes when foot switch is pressed. If relay K1 is inoperative, check for defective foot switch relay K1, timer U2, or 12-volt power supply. **WARNING: HAZARDOUS POTENTIALS ARE EXPOSED WITHIN THE SERIES 10K EYE MAGNET. DO NOT PROCEED UNTIL POWER IS DISCONNECTED AND CAPACITOR C4 IS COMPLETELY DISCHARGED.** If relay K1 operates, isolate open in magnetic head assembly power supply using resistance checks. Also check solid-state relay TR1.
Front-panel audible warning device inoperative.	Disconnect power and the magnetic head assembly. Check Resistor R4 and the front-panel audible warning device, if good, replace magnetic head assembly.
Front-panel meter is inoperative.	Check continuity through magnetic head assembly thermistor. If good check R1, R2, R3, D3, and D4. If all good, replace meter M1.

6.5. ADJUSTMENTS.

6.5.1. Four potentiometers are used in the Series 10K Eye Magnet. The following procedure details adjustment of these potentiometers. Adjustment of these potentiometers is not normally required, unless the circuitry has been repaired. Refer to the schematic diagram in Section VII for the following adjustments.

A. Meter Zero and Meter Calibrate.

1. With the magnetic head assembly disconnected, adjust the screw on the front of the meter to align the meter pointer with the beginning of the scale on the left of the meter.
2. Connect the magnetic head assembly to the console.

WARNING: HAZARDOUS POTENTIALS ARE EXPOSED WITHIN THE SERIES 10K EYE MAGNET. DO NOT TOUCH ANY COMPONENT WHEN ADJUSTING R1. USE AN INSULATED TUNING TOOL FOR ADJUSTMENT.

3. Use a thermometer to determine the temperature of the magnetic head assembly. With the magnetic head assembly at a temperature of 81.6 degrees fahrenheit (24 degrees Celsius), adjust potentiometer R1 to adjust the meter to an indication of 24.

WARNING: HAZARDOUS POTENTIALS ARE EXPOSED WITHIN THE SERIES 10K EYE MAGNET. DO NOT TOUCH ANY COMPONENT WHEN ADJUSTING R1. USE AN INSULATED TUNING TOOL FOR ADJUSTMENT.

4. Apply power and operate the unit until the thermometer indicates 111.6 degrees fahrenheit (30 degrees Celsius). Adjust potentiometer R2 to adjust the meter to an indication of 30.

B. Timer on/Timer off Calibrate.

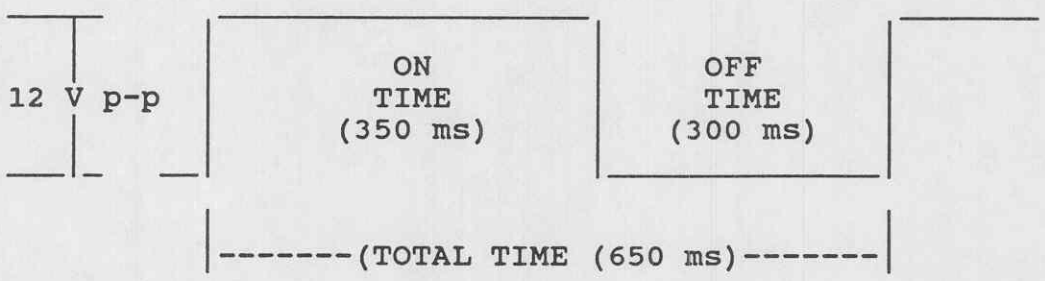
1. Connect the vertical input of an oscilloscope to the cathode of diode D9. Connect ground to the anode of diode D9.

2. Connect the handpiece to the console. Do not connect the foot switch.

3. Apply power to the unit.

WARNING: **HAZARDOUS POTENTIALS ARE EXPOSED WITHIN THE SERIES 10K EYE MAGNET. DO NOT TOUCH ANY COMPONENT WHEN ADJUSTING R11 AND R9. USE AN INSULATED TUNING TOOL FOR ADJUSTMENT.**

4. Potentiometer R11 controls the total time cycle of U2. Potentiometer R9 controls the on time period of U2. Adjust R11 for a total time period of 650 milliseconds and adjust R9 for an on time of 350 milliseconds (see figure 6-1).



Horizontal Sweep = 0.2 seconds
Vertical Amplitude = 5 volts/cm

Figure 6-1. Timer Waveform

SECTION VII. STORAGE

7.1. GENERAL.

7.1.1. This section details information pertaining to storage of the Scientronics Manufacturing Corporation 10K Eye Magnet and inspection during periods of storage.

7.2. STORAGE.

7.2.1. The Series 10K Eye Magnet is complete in one shipping container. If the shipping container has not been opened (shipping container seal intact) inspection during periods of storage is not required.

7.2.2. If the shipping container seal is broken, the shipping container must be opened and the contents of the shipping container compared to the parts list provided in the shipping container to assure the contents are complete. An inventory diagram is also provided in this section (see figure 7-1).

7.3. INSPECTION DURING PERIODS OF USE.

7.3.1. If the Series 10K Eye Magnet is being used, the following items require inspection. The console, foot switch, and magnetic head assembly should be inspected at monthly intervals. The magnetic tips should be inspected annually. If the Series 10K Eye Magnet is used in a corrosive, dusty, or extremely humid atmosphere, the inspection intervals should be increased as deemed locally necessary.

WARNING: Disconnect power before proceeding.

A. Console. Check the overall appearance of the console. If cleaning is required, clean the case with a solution of warm water and a mild detergent. Dry with a clean cloth.

B. Magnetic Head Assembly. When the instrument is operated as outlined in Section III of this manual, the magnetic head assembly will provide trouble-free service. Do not over-tighten the accessory tips. In the event the magnetic head assembly is dropped, permanent damage may result. The line cord should be periodically checked for security at the strain relief at the connector and at the magnetic head assembly.

C. Foot switch. The foot switch is mounted to the guard to prevent inadvertent magnetic activation. The foot switch is very rugged, however the cable entering the foot switch should be periodically checked for security.

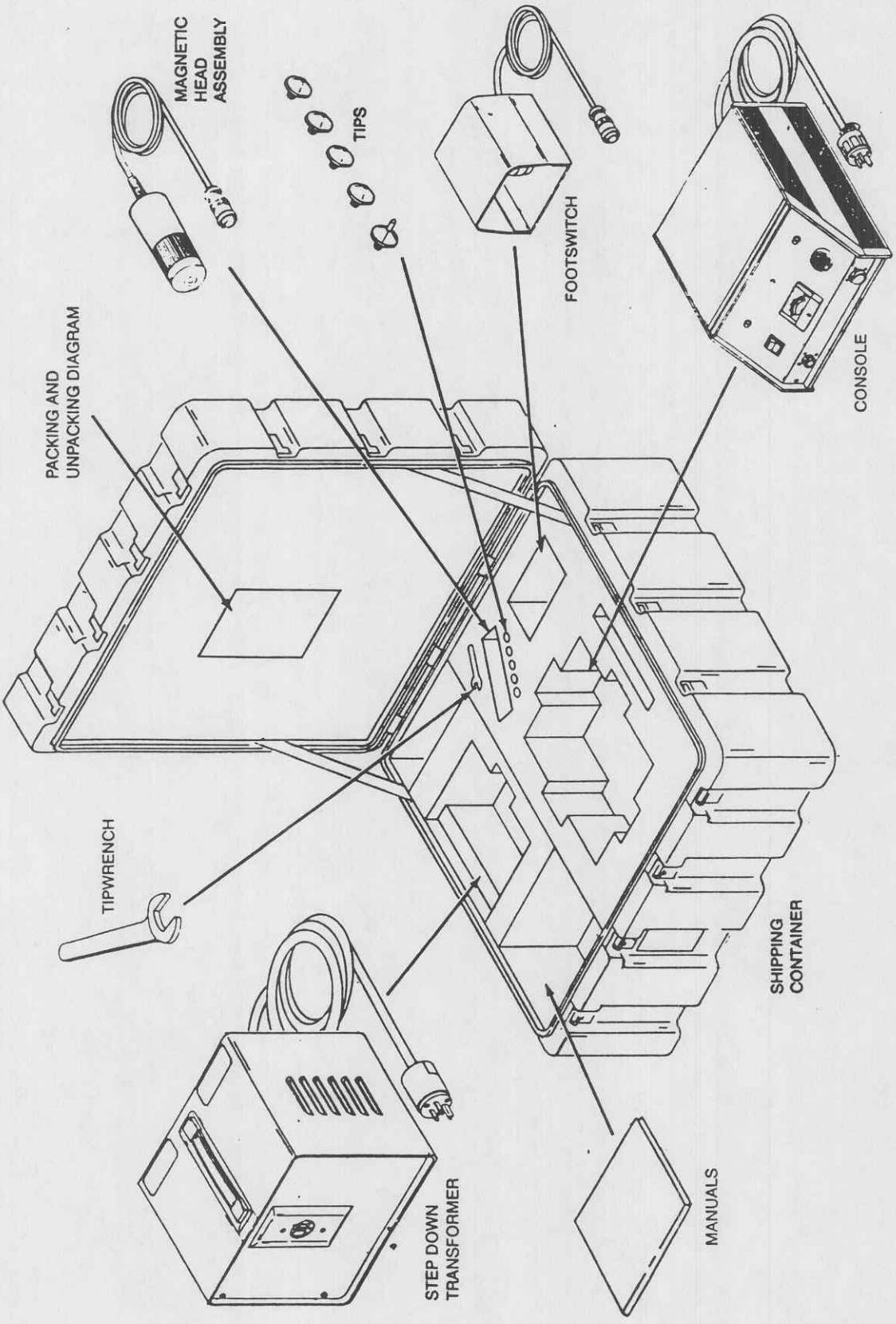


Figure 7-1. Series 10K Eye Magnet Inventory Diagram

D. Magnetic Tips. Check the threads on the magnetic tips to assure they are clean of foreign material and the threads are clear.

E. Step-Down Transformer Assembly. Check the overall appearance of the transformer assembly case. If cleaning is required, clean the case with a solution of warm water and mild detergent. Dry with a clean cloth.

F. Manuals. Assure the manuals are completely usable and readable. Manuals that have been exposed to moisture should be replaced.

SECTION VIII. DIAGRAMS

8.1. GENERAL.

8.1.1. This section provides schematic and assembly diagrams to aid in maintenance of the Scientronics Manufacturing Corporation Series 10K Eye Magnet.

8.2. DIAGRAMS.

8.2.1. This section provides the following diagrams.

TITLE	FIGURE
Schematic/Wiring Diagram, Sheet 1 of 2	8-1
Schematic/Wiring Diagram, Sheet 2 of 2	8-1
Circuit Board Assembly Diagram	8-2
Front Panel Assembly	8-3
Console Electronic Assemblies, Sheet 1 of 2	8-4
Console Electronic Assemblies, Sheet 2 of 2	8-4
Console Rear Assembly	8-5
Step-Down Transformer Assembly (Sheet 1 of 2)	8-6
Step-Down Transformer Assembly (Sheet 2 of 2)	8-6

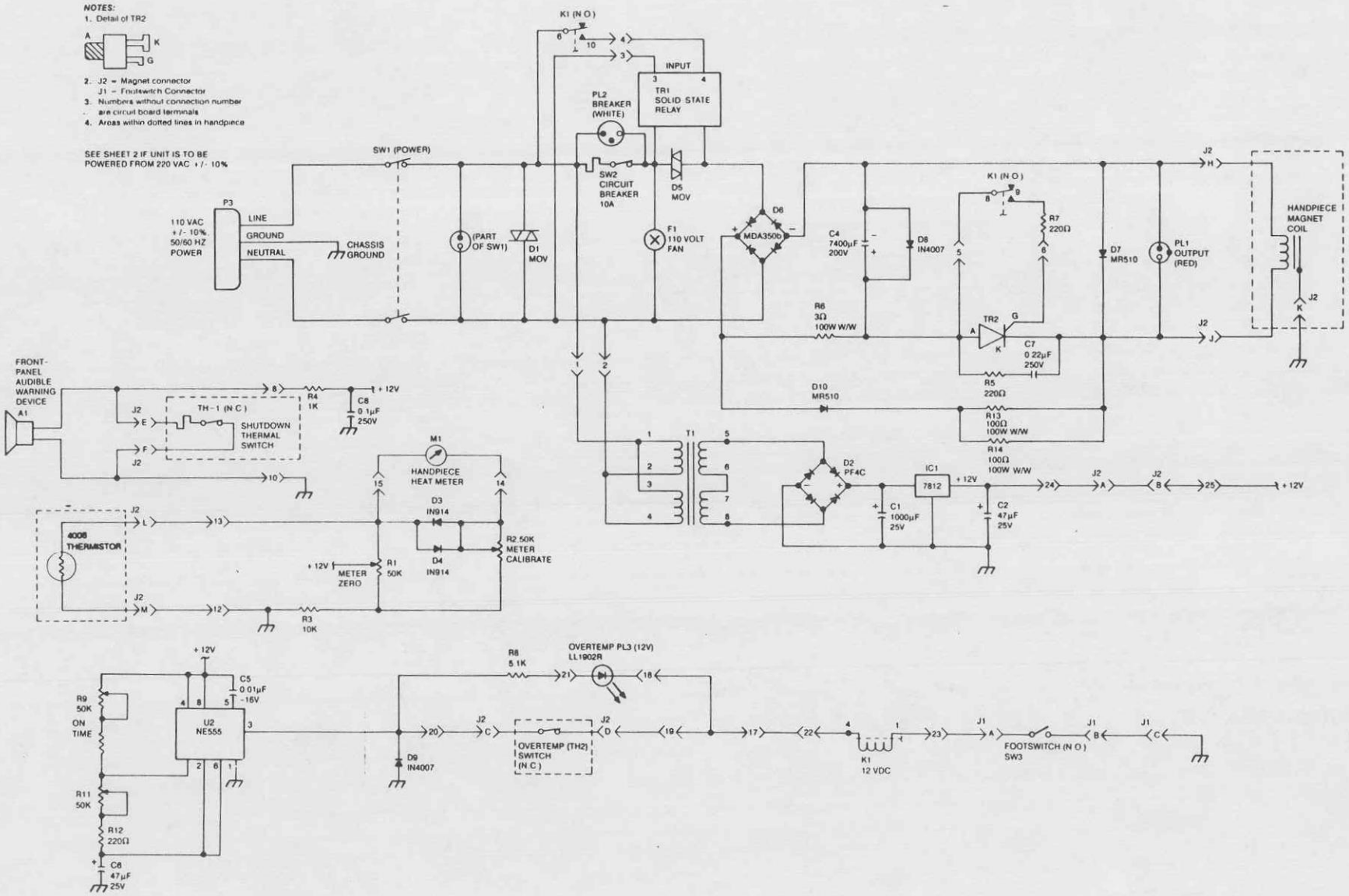


Figure 8-1. Schematic/Wiring Diagram (Sheet 1 of 2)

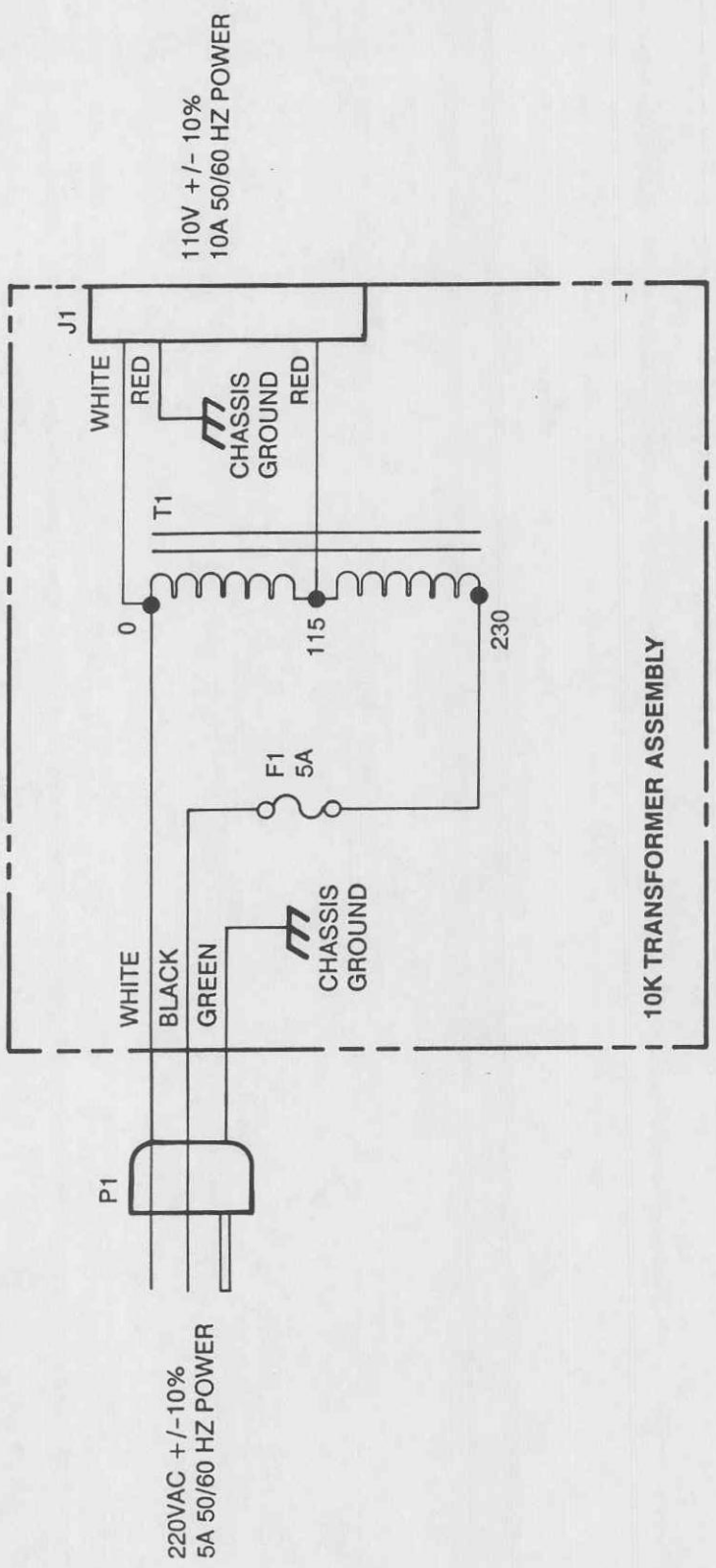


Figure 8-1. Schematic/Wiring Diagram (Sheet 2 of 2)

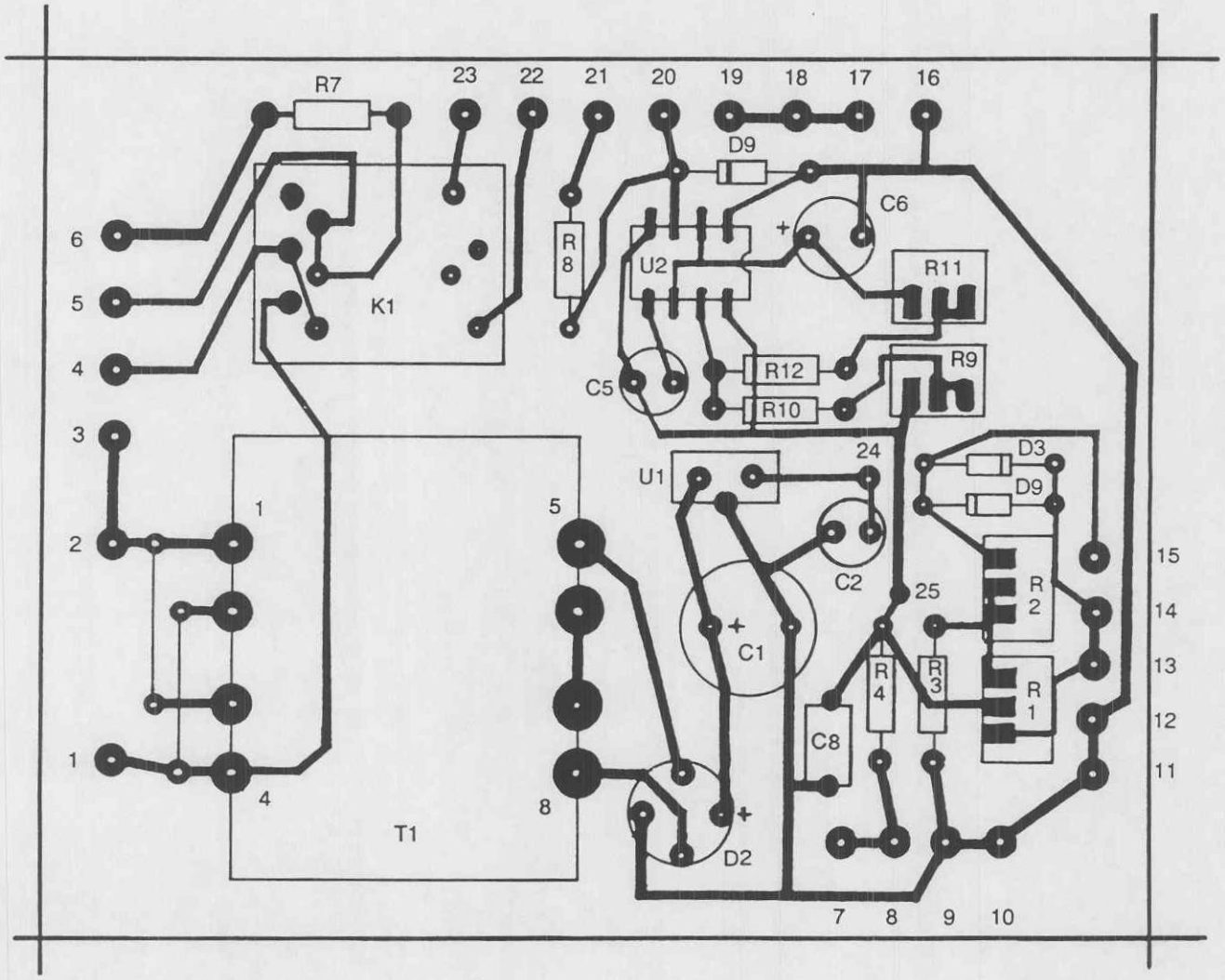


Figure 8-2. Circuit Board Assembly Diagram

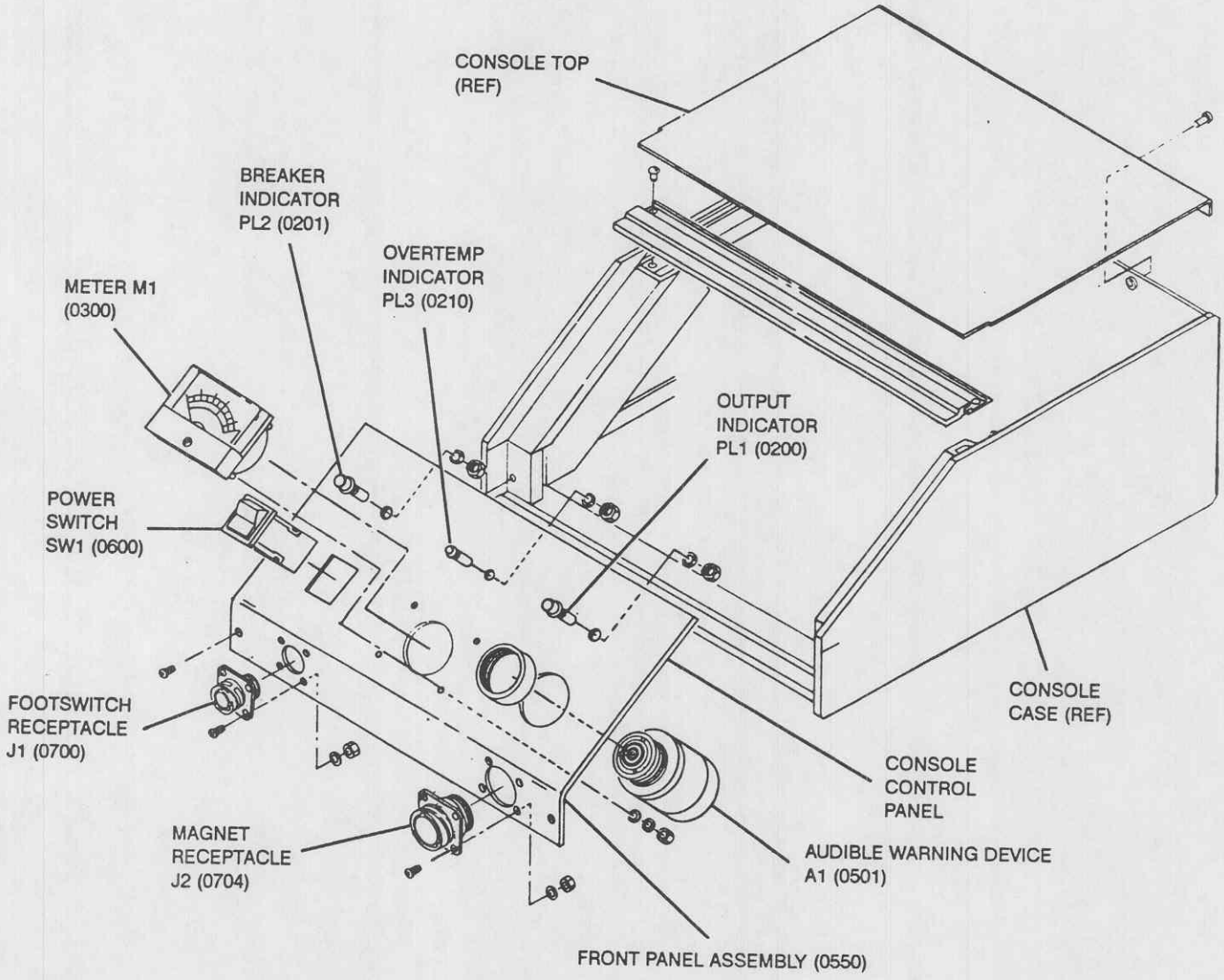


Figure 8-3. Front Panel Assembly

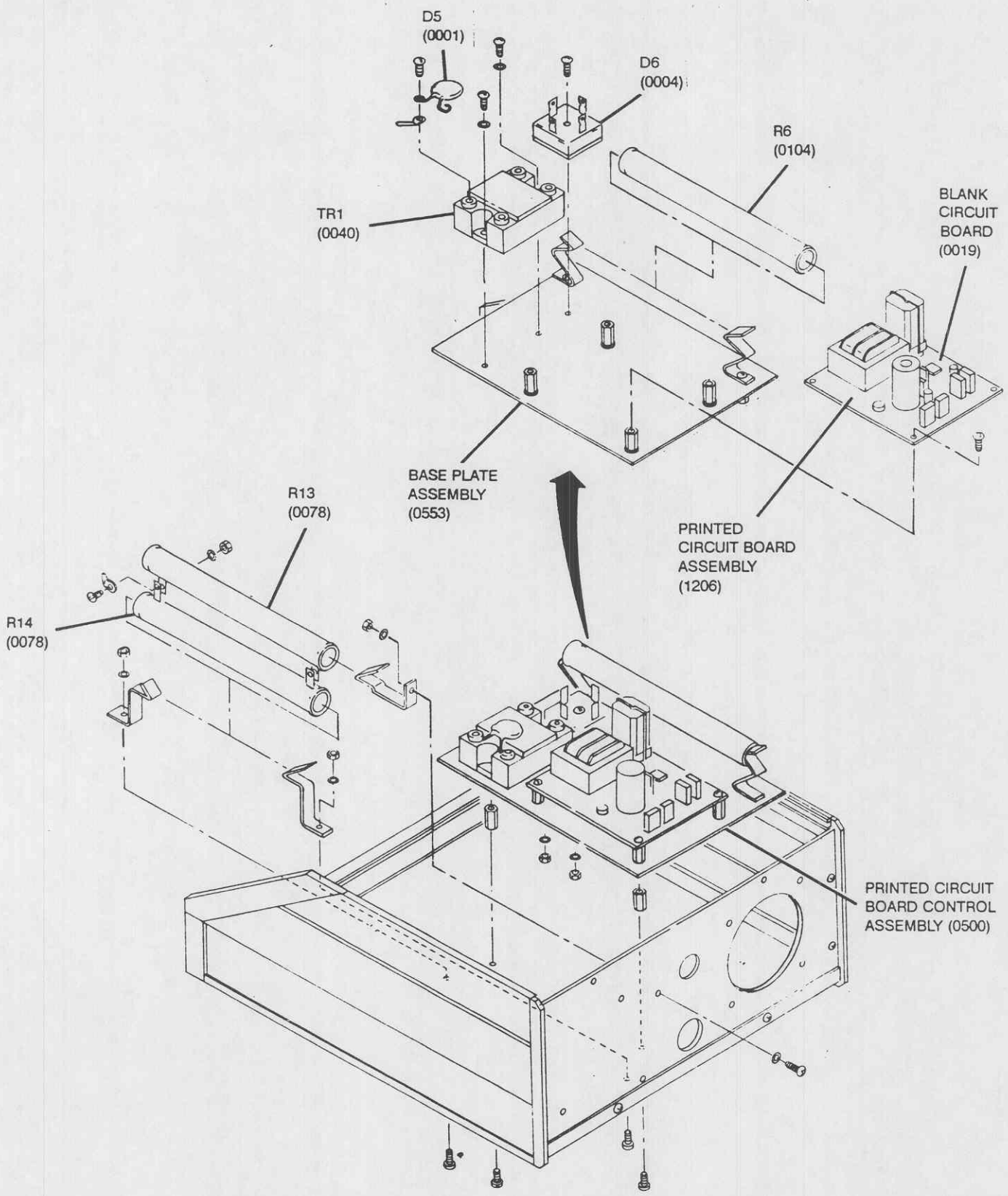


Figure 8-4. Console Electronic Assemblies (Sheet 1 of 2)

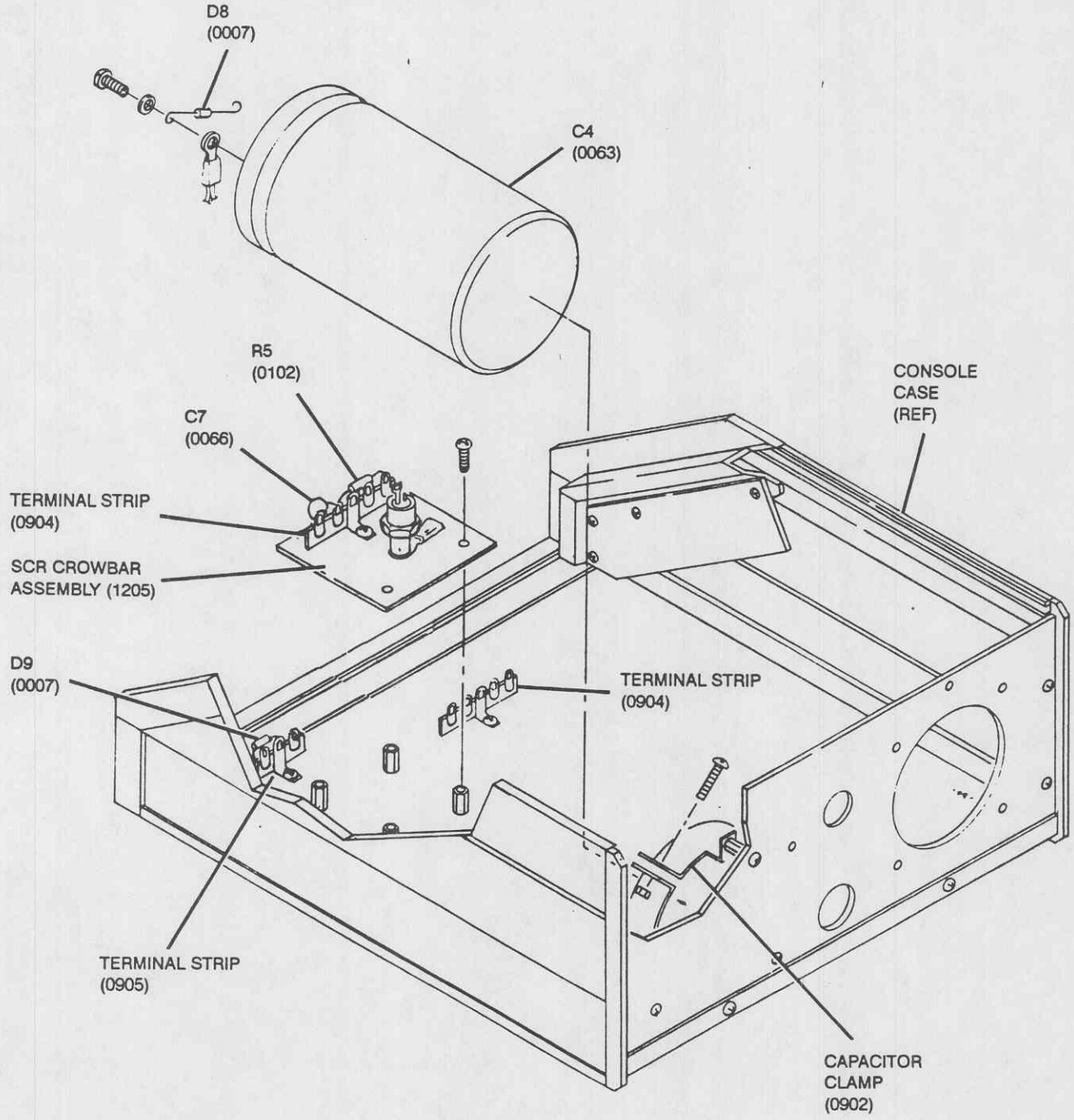


Figure 8-4. Console Electronic Assemblies (Sheet 2 of 2)

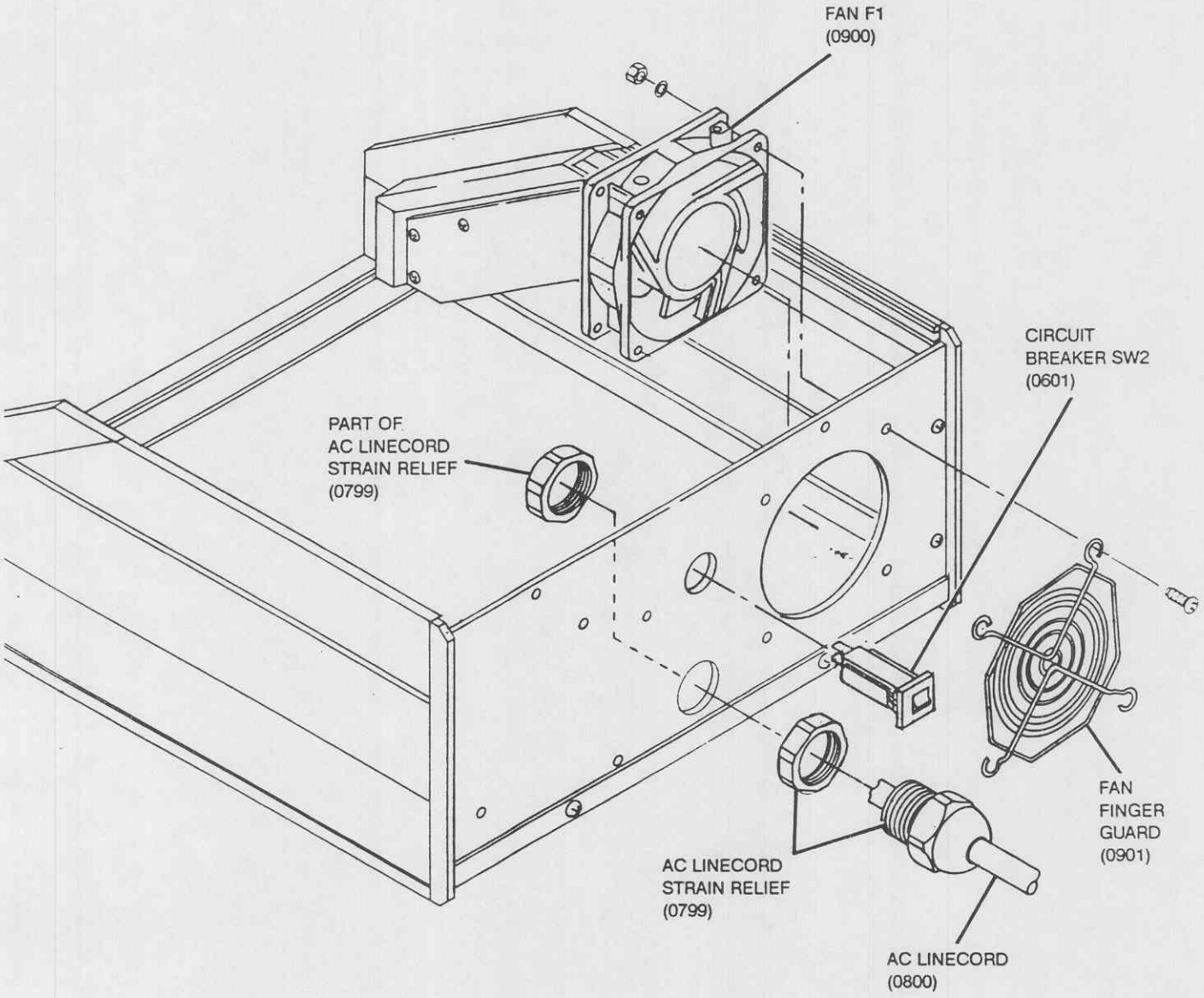


Figure 8-5. Console Rear Assembly

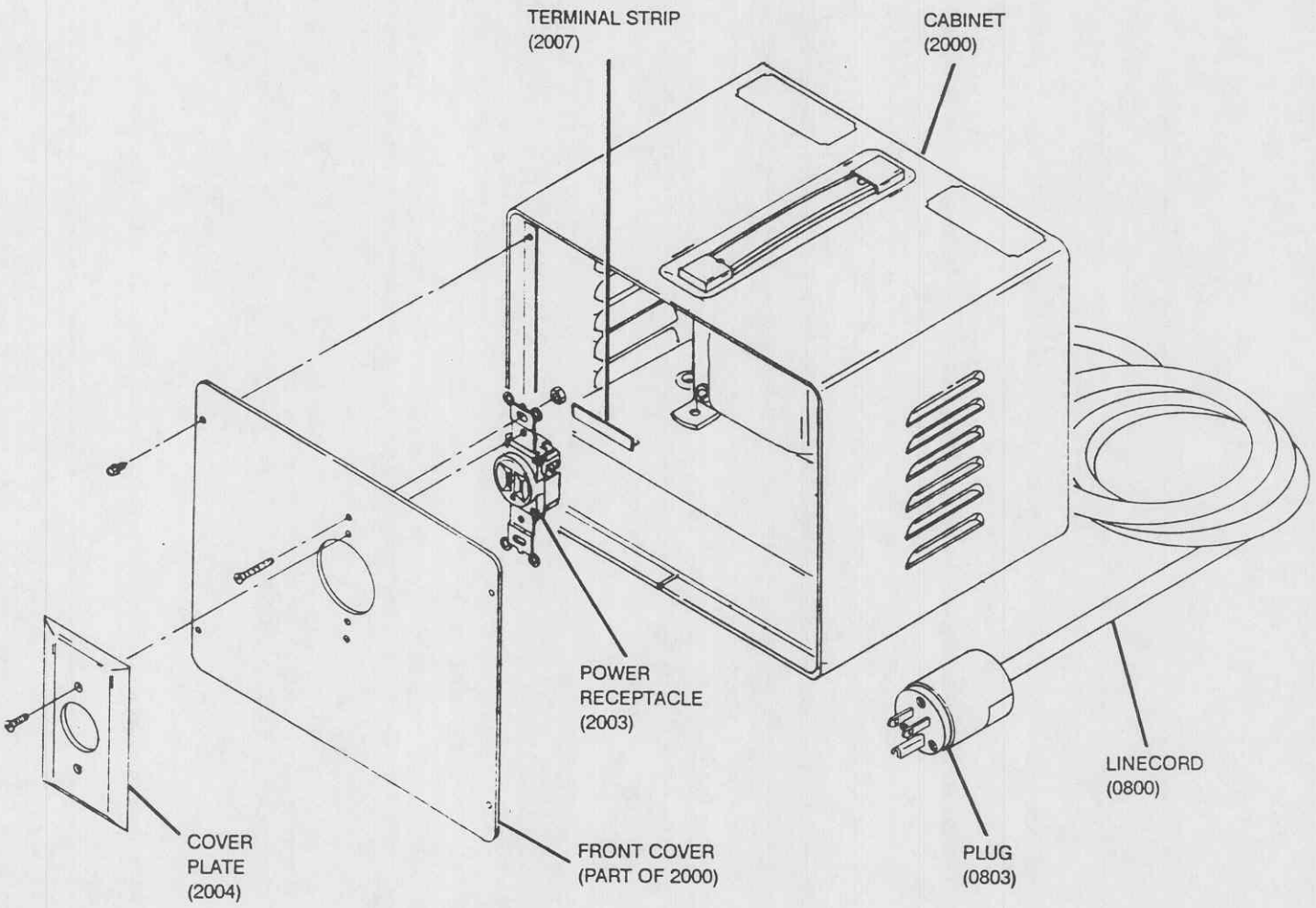


Figure 8-6. Step-Down Transformer Assembly (Sheet 1 of 2)

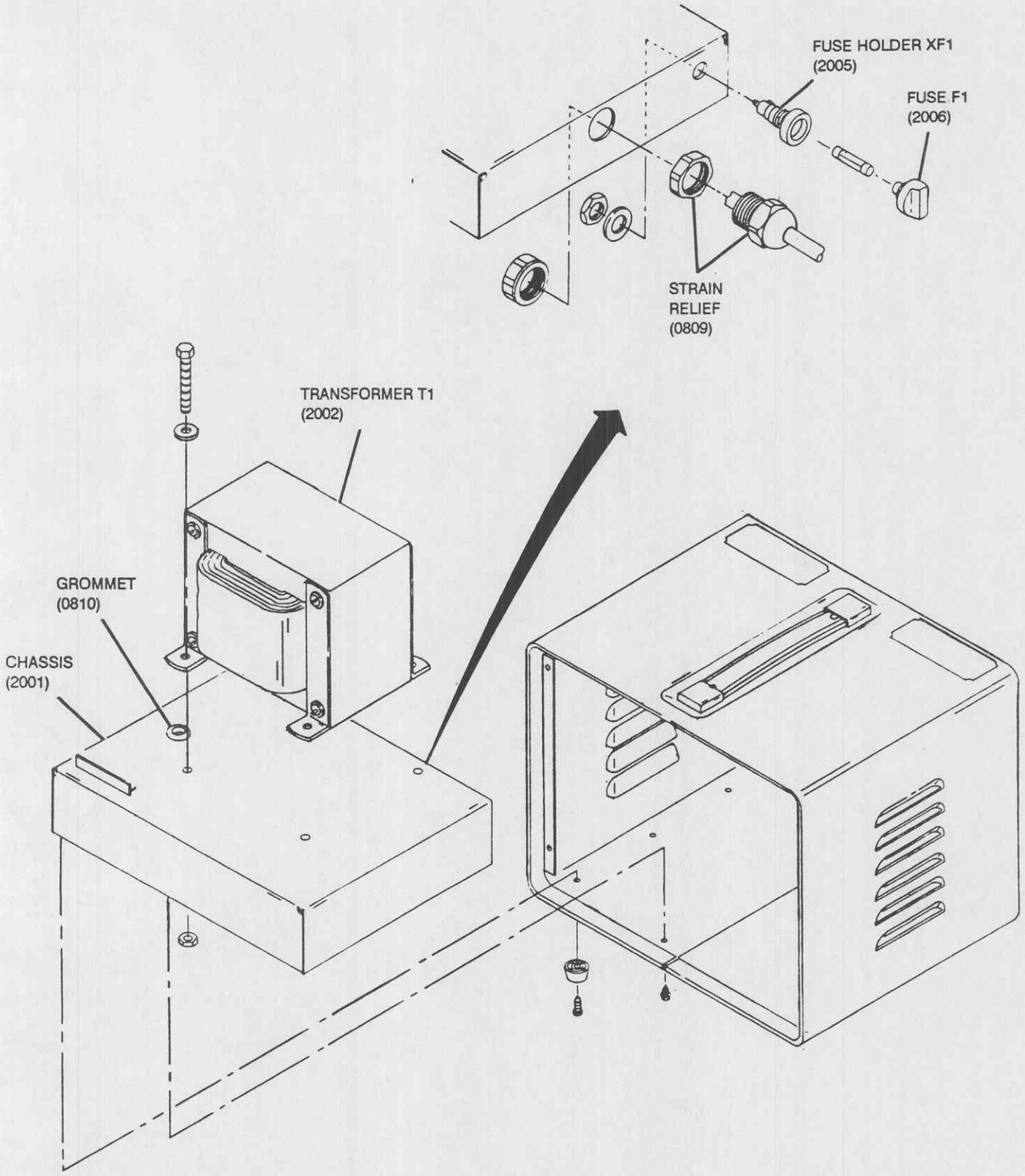


Figure 8-6. Step-Down Transformer Assembly (Sheet 2 of 2)

SECTION IX. PARTS LISTS

9.1. GENERAL.

9.1.1. This section provides a list of replacement parts for the Scientronics Manufacturing Corporation Series 10K Eye Magnet.

9.2. PARTS LISTS.

ITEM NAME	P/N	QTY	FIGURE	ITEM	REF DESIG
VARISTOR, METAL OXIDE, 250LA40A	1	2	8-1	1	D1, D5
DIODE, 1N913	18	2	8-1	2	D3, D4
BRIDGE RECTIFIER, FULL WAVE, PF4C	2	1	8-1	3	D2
BRIDGE RECTIFIER, FULL WAVE, MDA350B	4	1	8-1	4	D6
DIODE, MR510	5	2	8-1	5	D7, D10
DIODE, 1N4007	7	2	8-1	6	D8, D9
CIRCUIT BOARD, BLANK	19	1	8-1	7	
VOLTAGE REGULATOR,MC7812CT,+12V,TO220	20	1	8-1	8	IC-1
IC TIMER, NE555P, 8-PIN DIP	21	1	8-1	9	U2
RELAY, SOLID STATE, 90-220VAC CONTROL 240VAC @ 4A MAX OUTPUT	40	1	8-1	10	TR-1
SCR, MCR64-6	41	1	8-1	11	TR-2
TRANSFORMER, POWER	50	1	8-1	12	T1
CAPACITOR, 1000uF, 25V, ELECT.	60	1	8-1	13	C1
CAPACITOR, 0.1uF, 16V	62	1	8-1	14	C3
CAPACITOR, 7500uF, 200V, ELECT.	63	1	8-1	15	C4
CAPACITOR, 0.1uF, 250V	64	2	8-1	16	C8
CAPACITOR, 47uF, 25V	65	2	8-1	17	C6, C2
CAPACITOR, 0.22uF, 250V	66	1	8-1	18	C7
CAPACITOR, 0.01uF, 16V	67	1	8-1	19	C5
RESISTOR, 100 OHM, 100W, WIRE WOUND	78	2	8-1	20	R13, R14
RESISTOR, 5.1K, 1/4W	69	1	8-1	21	R8
RESISTOR (VARIABLE), 50K, 1/4W	80	4	8-1	22	R1,R2,R9,R11
RESISTOR, 10K, 1/4W	100	1	8-1	23	R3
RESISTOR, 1K, 1/4W	101	2	8-1	24	R4, R10
RESISTOR, 220 OHM, +/-5%, 1/4W	102	3	8-1	25	R5, R7, R12
RESISTOR, 3 OHM, 100W, WIRE WOUND	104	1	8-1	26	R6
INDICATOR LIGHT, NEON, OUTPUT	200	1	8-1, 8-3	27	PL1
INDICATOR LIGHT, NEON, BREAKER	201	1	8-1, 8-3	28	PL2
L.E.D., OVERTEMP	210	1	8-1, 8-3	29	PL3
RELAY CLIP	402	1	8-4	30	
METER	300	1	8-1, 8-3	31	M1
RELAY,DPDT,12V COIL,PBR10E1Y2-V185	400	1	8-1, 8-4	32	RL1
AUDIBLE WARNING DEVICE	501	1	8-1, 8-3	33	A1
SWITCH, INDICATOR, DPDT,	600	1	8-1, 8-3	34	SW1
BREAKER, 10 AMPERE	601	1	8-1, 8-5	36	SW2
CONNECTOR RECEPTACLE	700	1	8-1, 8-3	37	J1
CONNECTOR PLUG	701	1	8-1, 8-3	38	P1
CONNECTOR RECEPTACLE	704	1	8-1, 8-3	39	J2
CONNECTOR PLUG	705	1	8-1, 8-3	40	P2

ITEM NAME	P/N	QTY	FIGURE	ITEM	REF DESIG
BACKSHELL	702	1	8-3	41	P1
BACKSHELL	703	1	8-3	42	P2
SOCKET	706	1	8-4	43	
STRAIN RELIEF	799	1	8-5	45	
LINE CORD	800	8	8-5	46	
FAN, 110VAC	900	1	8-1, 8-5	55	F1
FAN GUARD	901	1	8-5	56	
BRACKET	902	1	8-4	57	
HOSPITAL GRADE POWER PLUG	903	1	8-1	58	P3
TERMINAL STRIP (5 LUG)	904	2	8-4	59	TB1, TB2
TERMINAL STRIP (3 LUG)	905	1	8-4	60	TB3
FOOTSWITCH	906	1	8-1, 1-1	61	SW3
FOOTGUARD	907	1	1-1	62	
WRENCH	555	1	1-1	65	
BLUNT TIP	9	1	1-1	66	
LANCE TIP	8	1	1-1	67	
3 MILLIMETER TIP	157	1	1-1	68	
6 MILLIMETER TIP	158	1	1-1	69	
12 MILLIMETER TIP	159	1	1-1	70	
12 MILLIMETER TIP, 45 deg.	160	1	1-1	71	
MAGNET HEAD ASSY	584	1	1-1	73	
FRONT PANEL ASSY	550	1	8-3	74	
REAR PANEL ASSY	551	1	8-5	75	
CIRCUIT BOARD ASSEMBLY	1206	1	8-4	76	
CONTROL ASSEMBLY	500	1	8-4	77	
FOOTSWITCH ASSY	330	1	1-1	78	
S.C.R. CROWBAR ASSY	1205	1	8-4	79	
BASEPLATE ASSY	553	1	8-4	80	

PARTS LIST FOR TRANSFORMER ASSEMBLY

ITEM NAME,	P/N	QTY	FIGURE	ITEM	REF DESIG
CABINET	2000	1	8-6	1	
CHASSIS	2001	1	8-6	2	
TRANSFORMER	2002	1	8-6	3	T1
RECEPTACLE	2002	1	8-6	4	
PLUG	803	1	8-6	5	
LINE CORD, 6 FT.	800	1	8-6	6	
COVER PLATE	2004	1	8-6	7	
FUSE HOLDER	2005	1	8-6	8	XF1
FI E	2006	1	8-6	9	F1
TE·MINAL STRIP	2007	1	8-6	10	
STRAIN RELIEF	809	1	8-6	11	
GROMMET	810	1	8-6	12	